TROPICAL DISEASES BUREAU.

TROPICAL DISEASES BULLETIN.

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HELMINTHIASIS.

MAYER (Martin). **Ueber die Verbreitung von *Clonorchis sinensis* und anderer Helminthen unter chinesischen Schiffsmannschaften.** [The Distribution of *C. sinensis* and other Helminths in Chinese Crews.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1916. May. Vol. 20. No. 9. pp. 209–215.

Early in 1915 the author noticed numerous Clonorchis eggs in the faeces of three Chinese from ships lying at Hamburg. A systematic examination was made on 260 Chinese seamen by the Telemann method and in each case three large cover glass preparations were searched. Trichocephalus occurred in 173, i.e., 66·5 per cent, Ankylostomes in 76, i.e., 29·02 per cent., Clonorchis in 109, i.e., 41·9 per cent. (7 per cent. of these were heavily infected) and Ascaris in only 2, i.e., 0·7 per cent.

A detailed tabular statement is also given showing the part of China from which each person originated and the incidence in each case of Ankylostoma, Clonorchis and Trichocephalus. Infections, to such a high percentage, with Clonorchis have only been reported hitherto from the Delta region of Tonkin. FISCHER had found only 8 out of 128 Chinese with this parasite at Shanghai. In the present record 203 individuals from Canton showed 99 or 48·7 per cent. infected, while of 30 from Shanghai only 5, i.e., 16·7 per cent. and of 27 from Fuchow only 5, i.e., 18·5 per cent. were positive. Out of 226 persons 203 were between the ages of 20 and 40; between 20 and 30 the infection was 39 per cent.; between 30 and 40 it was 50 per cent., while 10 out of 17, i.e., 58·8 per cent. of cases were between 40 and 50 and 3 out of 6 cases (50 per cent.) were between 10 and 20 years of age.

The infections produced no clinical symptoms. In one case of an old Chinaman in whom eggs had been seen seven worms were recovered from the bile ducts. Of these five when preserved were found to measure 2·2, 2·1, 2·0, 1·8, 1·7 mm. [? 22, 21, 20, 18, 17] in length, while the breadth varied between 3 and 4 mm.

[It may be stated that a number of Chinamen from ships in the Albert Dock, E., with clonorchis-like eggs in the stools were found to harbour *Heterophyes* in large numbers. The eggs are very similar. The above statistics may therefore require revision.]

R. T. Leiper.

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Gunn (Herbert). ***Clonorchis sinensis* in Orientals arriving in the United States.**—*Jl. Amer. Med. Assoc.* 1916. Dec. 16. Vol. 67. No. 25. pp. 1835–1836.

An examination of the stools of 604 Chinese arriving at San Francisco showed that 125, i.e., over 20 per cent. were infected with *Clonorchis sinensis*. The majority of these who were immigrants had been treated with thymol for hookworms en route. Of 82 sick Chinese who were residents of California 24 or 29 per cent. also harboured the infection. Several had been in the country continuously for from four to six years. Four out of 32 (i.e., 12 per cent.) sick Japanese residents were infected but had only been in the United States for a short time. Surgeon-General Blue considers that the introduction of *Clonorchis sinensis* into the United States should be guarded against.

R. T. L.

Treadgold (C. H.). **A Note on the Eggs of the Liver Fluke,** *Clonorchis sinensis*, var. *minor* (Verdun and Bruyant), 1908.—*Trans. Soc. Trop. Med. & Hyg.* 1916. Dec. Vol. 10. No. 2. pp. 33–35.

Eggs of this trematode were found in the stools of an Australian who had visited different parts of China. The smallest egg measured 20·8μ by 13μ and the largest 29μ by 16μ. The marked range is commented on by the author. In most of the cases the operculum and the constriction described as existing towards the anterior end were seldom well defined. Although it is known that experimental infections have followed upon the feeding of different freshwater fish to cats, rabbits and guinea-pigs, the author thinks that other sources of infection may exist and " in the absence of proof to the contrary we must admit the possibility of encysted cercariae being ingested with imperfectly washed salad, grown in water contaminated by the excreta of infected orientals."

R. T. L.

Nakagawa (K.). [*Paragonimus westermannii*, **Endemiological and Clinical Notes on Infections by.**]—*Tai Wan Igaku Kai Zasshi*, 1916. May 28. Nos. 150, 151. pp. 256–301. (Abstract based upon Review by R. G. Mills, in *China Med. Jl.* 1916. Nov. Vol. 30. No. 6. p. 465.)

Paragonimiasis is much more common in northern than in southern Formosa. Chinese and native Formosans are more heavily infected than Japanese. First attacks are fairly evenly distributed throughout the year. The opium habit is probably a direct result and occurs in over 11 per cent. of the patients. X-rays and radium treatments have proved without success. Vegetables, uncooked fish, unboiled water and shell fish are said to enter largely into the diet of the classes to which those infected chiefly belong.

R. T. L.

de Lavergne (P.). **Un cas de distomatose hépatique.**—*C. R. Soc. Biol.* 1916. Dec. 16. Vol. 79. No. 20. pp. 1098–1099.

Hepatic distomiasis is uncommon in man in Europe. The author reports a case due to *Fasciola hepatica* in a French soldier, a native of St. Gaudens (Pyrenees), who was recently invalided for febrile

exhaustion (*courbature fébrile*). The diagnosis was made from an examination of the faeces. The eggs measure 130μ + 8μ, and are uniformly ovoid, brownish in colour. The infection seems to be the cause of dysenteric symptoms and general ill health, which have lasted about seven years. In the discussion on this paper Professor Mesnil mentions that he had recently seen the eggs of a still rarer fluke, viz., the *Dicrocoelium lanceatum*, in the stools of a Belgian officer who had spent a considerable time in the Congo, at Katanga, and latterly in German East Africa.

R. T. L.

Clapier. **Les bilharzioses dans la Région militaire de la Guinée**—*Bull. Soc. Path. Exot.* 1916. Nov. Vol. 9. No. 9. pp. 739–747.

As a member of the Franco-Liberian Boundary Commission (1914–1916) the author had unique opportunities to investigate the incidence of bilharziasis in the French Military Zone of Guinea; that is the territory on the frontier of Liberia between Sierra Leone on the west and the Ivory Coast on the east which forms the watershed of the Upper Niger and the rivers which transverse the Grain Coast.

Investigations were made chiefly on urinary bilharziasis. It is noted however that intestinal infections occurred in eleven out of 154 children between the ages of about five and fifteen. In ten of these the eggs were lateral-spined; in a single case they were terminal. This incidence of infection is considered to be lower than would have resulted from a more careful and detailed microscopical examination as the eggs of *Schistosoma mansoni* are commonly very rare in the stools in intestinal bilharziasis. No cases of diarrhoea or dysentery due to Bilharzia were met with. The stools were soft or formed. In the Kissien country 257 individuals, chiefly boys between 5 and 15 years of age, were examined. Diagnosis had often to be based, however, on clinical information only. Of these 37 were accepted as positive. In the Toma country more careful investigation of children showed 64 positive cases, as determined by centrifugation, out of 108, i.e., 59·1 per cent. In several other villages the urine of 147 adults was also investigated with the help of the centrifuge. Sixty cases of bilharziasis were discovered. Whereas in the Toma country bilharziasis occurred in every second child, in the adult male the incidence diminished towards old age, while in the female it became increasingly prevalent. This is due to the domestic duties of women. They not only wash calabashes and household articles but carry water and devote considerable time to fishing. The men on the other hand work chiefly in the fields which are not irrigated as in Egypt. Quantitative examination of the blood was made in ten cases and the findings are tabulated [but the value of these is doubtful as ankylostomes were present in all of the cases].

R. T. L.

Robertson (A. Roche). **Case Reports from the Army Medical Services. I.—Bilharzias.**—*Canadian Med. Assoc. Jl.* 1916. Oct. Vol. 6. No. 10. pp. 913–914. With 1 fig.

This is a brief clinical note of a case of urinary Bilharziasis in a private in the Royal Canadian Regiment. The chief point worthy of

note is that the disease was not contracted during the present War, as might be inferred. The patient was in South Africa with the Third Manchester Regiment for four years being stationed at Middelburg, Cape Colony, for three years and afterwards at Middelburg, Transvaal. He left South Africa in December 1910.

R. T. L.

Traversa (G.) & Maccotta (L.). **Il primo caso di Bilarziosi in Sicilia importatovi dalla Cirenaica.**—*Malaria e Malat. d. Paesi Caldi.* 1916. Sept.-Dec. Vol. 7. Nos. 5–6. pp. 317–322. With 4 text figs.

The case is an Italian soldier, who had returned to Sicily from Cyrenaica, and had suffered for three years from urinary bilharzia contracted there. Blood examination showed 95 per cent haemoglobin, 4,800,000 red cells, 6,500 white cells and 2 per cent eosinophiles. The eggs were those of *S. haematobium.*

R. T. L.

Laning (R. H.). **Schistosomiasis on the Yangtze River, with Report of Cases.**—*U. S. Naval. Med. Bull.* 1914. Jan. Vol. 8. No. 1. pp. 16–36. With 17 figs.

It is not an uncommon thing for the gunboats of the various nationalities which patrol the Yangtze to come into port with a fair proportion of their crews completely disabled with schistosomiasis. Those who go in search of snipe appear to be especially liable to infection. Typical cases are said to have three characteristic stages: The initial stage "marked by a high afternoon temperature lasting from three to six weeks, a comparatively slow pulse rate, evanescent oedemas and urticarias, pains in the abdomen, generally in the upper part, cough with evanescent areas of pulmonary dulness, diarrhoea or constipation, marked eosinophilia, and often mental depression." The second stage is associated with "enlarged liver and spleen, with a heavy feeling in the upper abdomen, marked eosinophilia and some anaemia, loss of weight, slight degree of fever at some particular time of day, passage of blood-streaked mucus containing the ova in the stools, more or less tenesmus and straining at stool, sometimes diarrhoea or constipation."

The third or terminal stage may not supervene. It occurs after three to five years and especially if frequent re-infection takes place. It is marked by "cirrhotic liver, sometimes enlarged, sometimes shrunken, ascites, oedematous extremities, marked emaciation, anaemia, weakness, passage of blood and mucus in the stools" and sometimes there is a little fever. The patient may die of exhaustion or some terminal infection.

Laning adopts Houghton's suggestion that the urticarial Yangtze fever described by Lambert in 1910 is due to Schistosoma infection.

On the Yangtze river the most fruitful sources of infection appear to be Wuhu, Gnanking, Hankow and the Tungting Lake.

Clinical details are given of seven cases which occurred upon the U.S.S. "Quiros." It is almost certain that the infection was acquired during a stay at Yochow or Changsha on the Tungting Lake. The

incubation period is apparently 24 to 48 hours. The first stage as observed in these cases was as follows :—

" The temperature is normal or but slightly raised in the mornings. It commences to rise about noon and reaches its height, which is seldom above 102° F., about 6 in the evening, from thence gradually falling to normal, its decrudescence being accompanied usually with sweating. The presence or absence of the rash has no effect on the temperature, which may continue for days after all signs of the former have disappeared.

" The pulse rate, taken as a whole, is comparatively slow, and in some cases is below normal, even when there is fever present. In an average case it may be expected to be from 60 to 70 in the morning and from 75 to 85 at night. There is nothing special to be noted as to its volume or regularity ; it does not become dicrotic, but if abnormally slow may intermit.

" The effect of the disease on the respiratory passages is most important, particularly important from the point of view of diagnosis, as the symptoms referable to these parts may be assigned to other causes, such as tuberlosis, pneumonia, pleurisy with effusion, or empyema.

" The urticarial rash frequently appears on the mucous membrane of the buccal cavity, also on that of the nose, in the latter position causing temporary impediment to respiration through the nostril, the blockage passing off to the accompaniment of a profuse discharge of watery fluid. The larynx may also show the transient edema, but never, so far as is known, to a dangerous extent, the slight embarrassment to respiration caused by the swollen mucosa soon passing off. So far as the lungs themselves are concerned, the principal symptom is cough accompanied by more or less secretion. This may be distressing to the patient, coming on in paroxysms at irregular intervals and heralded by tightness in the chest, but it is the physical signs which trouble the practitioner. Perhaps on his first examination he finds dullness over one or other base and hears a fine crepitant râle, which makes him think of pneumonia. Possibly the rash has not yet made its appearance and the patient does not seem ill enough for an incipient pneumonia, so he is put to bed and the diagnosis left in abeyance for the present.

" The following day the rash may be out, and the patch of dullness in the lungs may have quite disappeared, the air entering freely. The attendant, glad that he has not committed himself, begins to hedge and directs his attention to the alimentary tract. If, as is possible, there is anorexia or diarrhea and vomiting, he thinks he may say ' ptomaine poisoning,' and probably does so. After a day or two, the patient in the meantime having been treated *secundem artem*, attention is again directed to the respiratory tract by a return of or, if it were never entirely absent, by an increase in the cough. Further examination of the chest reveals a new area of dullness involving, perhaps, the whole of one lung ; the breath sounds are distant and fine crepitations again heard. The respiratory rate is not, however, increased to the extent to which one would expect from the physical signs. A day or two more is allowed to elapse before another change in diagnosis is made, when, to the surprise of the examiner, he finds, in listening to the chest, that the lung, which the evening previously was apparently out of commission, is now admitting air freely, while the opposite organ is in the same condition from which its mate has emerged, though a few hours before it appeared to be healthy. And so it will go on from day to day, in spite of the treatment, to the wearying of the patient and the driving of the doctor to despair.

" In some cases the symptoms are distinctly more gastric and intestinal than pulmonary. All types suffer from anorexia and furred tongue and in most of the gastric forms examination of the lungs will show areas of dullness and some amount of cough will be present, but diarrhoea and vomiting are more marked in some cases than in others, while some may require treatment for constipation.

" A steadily increasing eosinophilia is encountered from the commencement. It reaches a high degree, in one case to 40 per cent. (One of my own cases had an eosinophilia of 85 per cent.) The eosinophilia gradually disappears as normal health is regained. There is always a certain amount

of anaemia present, which increases if the case is a prolonged one ; it is not uncommon to find the red cells reduced to 3,500,000 after three weeks of fever. At first there is a leucocytosis, but later, even with the eosinophilia, the leucocytes may be reduced to 6,000 or 4,000, the brunt of the decrease falling on the polymorphonuclears. The urine is of the usual febrile variety, diminished in quantity, with high specific gravity and increased urates. There was no albumen present in the samples from our cases. In several cases the spleen was found to be palpable. The liver in one case was said to be colored.

" The duration of cases of this type of fever varies considerably. In the milder sort the fever has disappeared at the end of a week or 10 days, the patient regaining his health at the end of a month. In all cases convalescence is comparatively protracted and in the severer types in which the fever lasts from three weeks to a month, restitution to complete health may be delayed for two or three months after the fever has disappeared. In those cases the temperature about the end of the second or third week begins to fall by lysis, the morning temperature being sometimes below normal. Frequently when the temperature has reached as low as 99° the evening it will remain at that level for days at a time."

Treatment consists in keeping in bed on a liquid diet for the first few days until the primary gastric disturbance has passed ; then a moderately light diet with aperitives. The second stage requires tonics, rest and change of climate ; the third stage should be dealt with as for cirrhosis of the liver from any other cause.

[With regard to the association of urticaria and fever with schistosome infection reference should be made to the annotations on papers by MIYAGAWA and by EDGAR in this *Bulletin*, Vol. 2, p. 177–9, in which it is maintained that these do not coincide in geographical distribution, etc.]

R. T. L.

MANN (William L.). **Some Practical Aspects of Schistosomiasis as found in the Orient. Preliminary Report.**—*Jl. Amer. Med. Assoc.* 1916. Nov. 4. Vol. 67. No. 19. pp. 1366–1368. With 2 charts.

Immediately on joining the United States ship " Helena " at Ichang in China the author had to deal with fourteen peculiar cases

" in which symptoms developed varying from acute bronchitis and urticarial dermatitis to dementia praecox associated with Jacksonian epilepsy and hemiplegia. It was two weeks later, on arrival at Hankow, China, that continued laboratory examinations and further study of the literature convinced me that my cases with tentative diagnoses of cerebral syphilis, sunstroke, hepatic abscess, acute phthisis, etc., might have the same etiologic agent, namely, *Schistosoma japonica*. All cases occurred among forty-two men who had been on a three days' landing party to the gorges above Ichang, and had been bathing in subsidiary streams."

LANING'S classification of the symptoms of the disease is followed by the author. The first stage is the so-called urticarial or Yangtze fever. In 14 cases urticaria, subcutaneous oedema and elevated temperature appeared from twenty-four to seventy-two hours after exposure to infected water.

" In eight out of ten cases there was diarrhea, and in seven this was accompanied by cramps ; four of the eight were troubled with nausea and vomiting. There was pain and tenderness over the liver in one third of the patients, and half of them were troubled with cough, expectoration, and other symptoms of pulmonary affections. In one case the pulmonary symptoms were so well marked as to suggest incipient pneumonia. This was the only case presenting the evanescent areas of pulmonary dulness

described by other writers. Eight out of the ten cases had elevated temperature varying from 100° to 104° F.; in 75 per cent. there were urticarial wheals and subcutaneous edema, varying from two or three per patient, to cases in which the face was so swollen that the features were scarcely recognizable."

The second stage is that following the fall of temperature and continues to the establishment of convalescence unless the third stage supervenes with the passage of eggs. A minor number of parasites are suspected to cause the various subjective and objective symptoms of this stage such as " transient cough and expectoration, diarrhea and temporary abdominal pain and tenderness, hepatic disturbances, anemia, attacks of pyrexial conditions," and lassitude and slight debility. The diagnosis is often obscure.

In the third stage dyspeptic symptoms are pronounced associated with dysentery and diarrhoea, hepatic and splenic hypertrophy followed by shrinking of the liver, cachexia, emaciation, ascites and finally general anasarca. This stage is comparatively rare in foreigners.

Clinical details of six cases are given. Salvarsan is said to have been beneficial " in the second stage." The author suspects that a small percentage of cases suffering from tropical neurasthenia in China are really obscure " secondary stage " cases of schistosomiasis.

R. T. L.

Ogata (S.). **Ueber den anatomischen Körperbau der Cercarien des *Schistosomum japonicum* und die Uebertragungsweise derselben auf Tiere.** [The Morphology of *S. japonicum* Cercariae and the Mode of their Transmission to Animals.]—*Verhandl. der Japan. Pathol. Gesell., Tokyo.* 1914. Vol. 48.

The anterior portion of the cercaria is barrel-shaped, tapering towards the anterior end. The mouth is guarded by short lancet-shaped bristles and is enclosed in a stout musculature. There is a blind sack, probably the beginnings of a gut. A smaller roundish ventral sucker lies at the posterior sixth of the body. The hinder part of the cercarial body contains three pairs of poison glands; from each a duct passes forwards to discharge into the mouth. The excretory organs are two paired laterally symmetrical flame cells with vessels. In the middle line of the body and in front of the ventral sucker is an oval light brownish structure from which a small canal passes forwards. The tail is somewhat larger than the body and is split into two in its last third. Two flame cells are symmetrically located near the base of the tail. The cercaria passed through the skin in experimental animals. Then by the blood stream they pass to the lungs.

R. T. L.

Gonzalez (Martinez I.). **Investigations on the Prevalence and Clinical Features of Intestinal Bilharziosis (Schistosomiasis Mansoni) in Porto Rico.**—*New Orleans Med. & Surg. Jl.* 1916. Nov. Vol. 69. No. 5. pp. 352–394. With 8 figs.

Intestinal bilharziasis is a disease naturalized many years since in the Antilles and other regions of the American Continent. Evidence of its occurrence among natives was first brought forward by the author

in 1904. Previous papers on bilharziasis in America all refer to cases of bilharzial haematuria due to *Schistosoma haematobium*. The author is of opinion that *S. mansoni* was undoubtedly introduced to America by West African negroes. He is convinced on epidemiological grounds that it is a distinct species. In over 300,000 persons examined by the Anaemia Commission of Porto Rico and by the staff of the Institute of Tropical Medicine and Hygiene not one case of bilharzial haematuria has been discovered.

Manson's intestinal bilharziasis has no predilection for age, sex or race. In Porto Rico it has spread around the entire coast of the Island and prevails in the zones where sugar-cane is cultivated and in the valleys crossed by large rivers At Utuado the endemic index is 2·16 per cent., while at Mayaguez with its extensive bottom lands and numerous swamps it is 8·4 per cent. Although in the majority of cases it is probable that the parasite enters through the skin it is undeniable that certain subjects could only have become infected through the alimentary canal. The clinical features of intestinal bilharziasis in Porto Rico are :—(1) a slight infection in 44 per cent. without symptoms ; (2) pseudodysenteric forms in 40·9 per cent. This is chronic from the beginning with frequent attacks of colic accompanied by mucus or mucosanguinolent stools, generally 4 to 6 but at times 12 to 15 a day. Tenesmus is moderate, associated with sensation of weight in the rectum and accompanied by pruritus and piles. (3) Enterocolitic forms in 14·5 per cent. of the cases. This is characterised by absence of diarrhoea with constipation of moderate intensity. The stools are hard and coprine and are enclosed in mucus occasionally sanguinolent. There is moderate intestinal colic, and slight pains in the hepatic or epigastric region are frequent. The appetite is good and general health hardly suffers. Even in the most serious form there is only slight anaemia. Regeneration of blood resulting in a haemoglobin of 99 per cent. to 100 per cent. was noted. There is moderate leucocytosis, eosinophilia and mononucleosis. In benign infections a spontaneous cure occurs in never less than ten years after the subjects have left the endemic centres.

The author's two series of cases total 356. Of these 136 are from Mayaguez in 1904–5 and 220 from Utuado in 1913. Thirty-two occurred under age ten, 127 between ten and nineteen, 119 between twenty and twenty-nine years, 43 between age thirty and thirty-nine, and 31 over forty years, while 4 were unclassified.

R. T. L.

Risquez (Jesús Rafael). **Nota sobre la invasión de los ganglios linfáticos por los huevos del** *Schistosoma mansoni*. [On the Infection of Lymphatic Glands by the Ova of *Schistosoma mansoni*.]—*Gaceta Med. de Caracas*. 1916. Sept. 15. Vol. 23. No. 17. pp. 135–136.

The author states that in sections of the abdominal glands from four fatal cases of bilharziasis which came to an autopsy, he was able to find in every section (0·01 mm. thick) about 50 ova of *Schistosoma mansoni*, making a total of several thousands for every gland infected.

J. B. Nias.

Lutz (Adolpho). **Observações sobre a evolução do *Schistosomum mansoni*. Nota previa.** [Observations on the Development of *Schistosomum mansoni*. Preliminary Note.]—*Brazil Medico.* 1916. Dec. 2. Vol. 30. No. 49. pp. 385–387.

On receiving Leiper's report of his Bilharzia mission to Egypt, the author commenced the study of the infection of Brazilian molluscs by *S. mansoni*. Of five species of Planorbis experimented with, *P. olivaceus* Spix proved the most suitable. The miracidia penetrate by preference the bases of the antennae and cause, within the space of three or four days,the development of tumours which diminish in size and fade away again after the lapse of about three weeks. The tumours consist of spherical masses of round cells possessing a relatively large nucleus, which elongate after a few days and become sporocysts. About the beginning of the third week they show spontaneous movements and migrate to the visceral cavity, where they take on the form of cercariae. The author confirms Leiper's account of the process. The evolution of *S. mansoni* depends very much on the warmth of the season, and is much impeded by a low winter temperature. *Planorbis ferrugineus* Spix, and *P. tenagrophilus* d'Orb., can also be infected, but the process of development in these species comes to an end prematurely.

A fuller account is promised for the *Memorias do Instituto Oswaldo Cruz.*

J. B. N.

Stewart (F. H.). **On the Life-History of *Ascaris lumbricoides*.—*Brit. Med. Jl.*** 1916. Dec. 2. pp. 753–754.

In earlier papers [this *Bulletin*, Vol. 8, pp. 197 and 515] it was shown that when the eggs of *Ascaris lumbricoides* containing developed embryos are administered experimentally to rats and mice they hatch in the alimentary canal. By the eighth day the larval ascaris reach the mouth via the liver and lungs. Further experiments are now recorded which show that the larvae persist in the lungs and trachea of mice on the ninth, tenth, eleventh and twelfth days after infection and migrate down the alimentary canal on these days. The worms traverse the stomach and small intestine with some rapidity and accumulate in the caecum and large intestine. A large number are voided in the faeces. These experiments lead the author to supersede his former statements that " no larvae were found in the respiratory tract later than the eighth day after infection " and that " it is probable that they emigrate in the saliva of the rodent on to food substances such as bread." Details are given of five new experiments on mice. The Ascaris larvae were measured on the 8th, 9th, 10th, 11th and 12th day. The worms vary between 1 mm. and 2·1 mm. in length.

R. T. L.

McGlannan (Alexius). **Intussusception in Acute Intestinal Obstruction, with Report of a Case occurring with Round Worms.—*Southern Med. Jl.*** 1916. Nov. Vol. 9. No. 11. pp. 977–979.

In two out of 23 cases of intestinal obstruction worms were considered to be the etiological factor inducing the invagination. One

case is reported. The patient was a white girl, aged four, who was suffering from severe anaemia, was admitted to hospital on 9th December, 1912, and was found to be infected with round worms. For this, santonin, calomel and magnesium sulphate were given at intervals. On January 20th, 1913 there was an attack of vomiting with slight colic. Santonin and salts were again administered. The bowels moved but the pain and vomiting returned on the following day. There was now epigastric distension. The leucocytes were 18,000. Enemas were ineffectual but later a high enema proved effectual. As the symptoms had not been relieved, there being a localised distension just above the umbilicus an operation, for acute intestinal obstruction was performed. Two intussusceptions were discovered, both were easily reduced and in each was a round worm. One was situated in the terminal portion of the ileum, the other high up in the jejunum. As the worms could not be moved along the bowel by manipulation on account of the spastic contraction of the intestinal wall, the bowel was opened and the worms were withdrawn. No others were seen or felt. The child did not rally.

R. T. L.

Billings (W. C.) & Hickey (J. P.). **Some Points about Hookworm Disease, its Diagnosis and Treatment.**—*Jl. Amer. Med. Assoc.* 1916. Dec. 23. Vol. 67. No. 26. pp. 1908–1912. With 4 text figs.

From observations made for a period of over three years upon Orientals at the United States Immigrant Hospital, Angel Island, California, the authors are convinced that routine microscopical examination for hookworm eggs is essential wherever a diagnosis in an Oriental is not apparent or is at all doubtful. Out of 6,428 stools of Oriental aliens 3,320 contained eggs of either *A. duodenale* or *Necator americanus*. As hookworm disease was found to be present in a large proportion of Chinese merchants who had visited China for a year after residence in the United States of from fifteen to forty years and who had not been engaged in agricultural pursuits nor had gone barefooted during their visit, it is considered that hookworm infection is contracted by "unconscious coprophagy" due to the eating of raw vegetables, to a much greater extent than has been commonly supposed. This view is supported by the occurrence of hookworm in bound-footed Chinese women who have never gone barefooted even in their own homes. A rather common and unnoted symptom of infection in Orientals is a condition similar to an arcus senilis even in young persons. A simple method for routine use of the centrifuge is given.

"1. Take a piece of (preferably) formed stool, approximately the size of a walnut, place it in a porcelain cup, and after adding about 60 cc. of *cold* water, thoroughly break up the mass with the aid of a wooden tongue depressor. When the suspension is as complete as possible, destroy the tongue depressor.

"If the stool is liquid, add an equal bulk of cold water and mix as directed above.

"2. After placing over the mouth of the cup two or three layers of wide mesh surgical gauze, strain a portion of the contents of the cup into a centrifuge tube and centrifuge for ten seconds at full speed (which means 2,000 revolutions a minute).

"The gauze is thrown away and a new piece used for the next specimen. The cup is emptied of its remaining contents and thoroughly scalded.

" 3. Remove the tube from the centrifuge, and without disturbing the sediment, pour off the supernatant liquid and refill with cold water to about three-fourths the capacity of the tube.

" 4. Place a thoroughly clean rubber pad over the mouth of the tube, hold in place by the thumb, and shake vigorously. When preparing two tubes at the same time, extreme care will be necessary that the rubber pads are used on their respective tubes at each shaking.

" 5. Again centrifuge for ten seconds at full speed.

" 6. Pour off supernatant fluid as described above, and refill with cold water. Again shake.

" 7. Centrifuge for ten seconds at full speed.

" 8. Pour off supernatant fluid, leaving about one-half inch overlying the undisturbed sediment. The specimen is now ready for microscopic examination."

Differential diagnoses of hookworm ova and those of Ascaris, Schistosoma and *Strongylus subtilis* are given. The eggs are illustrated by good photographs. For treatment oil of chenopodium has been used exclusively during the past year. It is more efficient than thymol and dietetic precautions are unnecessary. Where idiosyncrasy is exhibited, free purgation and stimulation with hot coffee is recommended. It has been found preferable to administer the chenopodium oil on sugar than to give it in capsules, emulsion or in tablet form. Chloroform is a marked synergistic when given afterwards with castor oil; 2 cc. are as efficacious as 3 cc. and give no untoward symptoms.

R. T. L.

Spear (R.). **Hookworm Infection in Cuba.**—*U.S. Nav. Med. Bull.* 1917. Jan. Vol. 11. No. 1. pp. 50–53. With 10 plates.

At the dispensary of the United States Naval Station, Guantanamo Bay, in Cuba, 2,206 specimens of faeces were examined between April 1914 and August 1916. These were collected from inhabitants of the eastern end of Cuba. Many cases came from the region of Baracoa on the northern coast, while a few were derived from Camaguey in the centre of the island. The various species of parasites were present in the stools in the following percentages :—

Hookworms	51%
Whipworms	52%
Roundworms..	20%
Strongyloides	15%

Cuba is losing, from hookworm infection, the services of many who might be working. The infection is so widespread that it is remarkable that all are not infected. The monetary value of the actual loss in labour reaches millions of dollars annually. Prosperous sugar-cane growers and successful business men were victims as well as poor Cubans. Cuban doctors rarely suspect hookworm or examine for it. Many instances seen by consulting physicians were labelled malaria, anemia, liver disease, etc. Cases of severe malaria and of incipient tuberculosis rarely recovered if there was a coexisting hookworm infection that had been overlooked. Two cases of asthma and one of violent Sydenham's chorea were cured by a course of thymol. In advanced cases fatty degeneration of the heart and kidneys may occur with all the accompanying symptoms. The anaemia often results in puffiness under the eyelids. The hair lacks lustre and looks dry.

Epigastric distress and tenderness with acid eructations, general weakness and mental lethargy are among the most constant symptoms. It was noticed that "people infected with hookworms almost always stumbled when they walked over a board placed on the floor." Knee jerks were less than normal. The blood pressure was low, in some cases under 80 mgm. of mercury. Thymol and oil of chenopodium were used, the latter in capsules of 16 minims, three doses being administered, one hour apart and followed by castor oil. If the patient came from a distance and the stools could not be re-examined, thymol and chenopodium were prescribed for alternate weeks and continued for a period of from four to six weeks. The text is illustrated with 50 photos, which indicate the extremes of classes and age, of robustness and emaciation, and the multiplicity of types that are met in Cuba.

R. T. L.

Juerss (Fritz). **Ueber die Behandlung der Ankylostomiasis mit Oleum Chenopodii.** [Treatment of Ankylostomiasis by Oleum Chenopodii.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1916. May. Vol. 20. No. 9. pp. 215–216.

The examination of the Indian crews of two vessels showed that ankylostome infections were present. In one ship 37 out of 50, i.e., 74 per cent., in the other 2 out of 23, i.e., 8·7 per cent. were infected. Oil of chenopodium was administered by Schüffner and Verwort's method, i.e., 16 drops were given three times at two hourly intervals and finally, after two hours more, castor oil and chloroform. The ankylostomes and ascarids were evacuated, but in later examination of the faeces Trichocephalus eggs were found.

The dose of 3 gm. of chloroform produced a stage of marked excitement in the Lascars. This effect was not induced by 2 gm. doses administered to a Chinese patient from another ship.

R. T. .

Famulari (Sebastiano). **La distribuzione geografica dell' Anchilostomiasi nella provincia di Messina.**—*Malaria e Malat. d. Paesi Caldi.* 1916. Sept.-Dec. Vol. 7. Nos. 5–6. pp. 305–309. With 2 maps.

An inquiry into the incidence of ankylostomiasis in the hamlets of the districts of Messina, Castroreale, Palti and Mistretta gave a total of 283 cases. Of these 239 occurred in the district of Messina, the highest number in a single village being 20 at Gesso. A map is appended to the article and shows by special markings the relative incidence of the disease.

R. T. L.

Elders (C.). **Over oesophagostomiasis.** [On Oesophagostomiasis.]—*Nederl. Tijdschr. v. Geneesk.* 1916. No. 5. pp. 440–442.

A paper read before the Nederl. Vereeniging voor Tropische Geneeskunde at their meeting on January 30th, 1916. The author exhibited a specimen of the colon of a gibbon which had died from perforation of

the intestine, after suffering from dysentery for nine days. The perforation was due to the rupture of a cyst containing worms of the species *Oesophagostomum brumpti*. Their ova were found in the stools. Some worms were free in the peritoneal cavity.

J. B. N.

da Silva (Ribeiro). **Hyperemése determinada por tricocephalose.** [Hyperemesis caused by Trichocephaliasis.]—*Brazil Medico.* 1916. Oct. 7. Vol. 30. No. 41. p. 323.

The case of a girl, 9 years old, who suffered for more than two months from vomiting which came on about an hour after taking food. It was surmised that there was a functional stenosis of the pylorus. Medical treatment of every kind having proved ineffective, a microscopic examination was made of the stools, which revealed the presence of a large number of ova of Trichocephalus. The administration of thymol caused the expulsion of large masses of adult Trichocephalus, and with their expulsion, the vomiting ceased. The author remarks that, in general, it is the larger worms which cause this rebellious vomiting, and he mentions the case of a lady whose stomach rejected everything for four consecutive days, until the symptoms terminated by the vomiting of four large Ascarides.

J. B. N.

Yamada (M.) & Yamamoto (T.). [*Filaria bancrofti*, **Possible Reason for the Appearance of the Larvae in the Peripheral Circulation at Night.**]—*Tokyo Igak Kwai Zasshi.* 1916. Apr. 20. Vol. 30. No. 8. pp. 465–473. (Abstract based upon Review by R. G. Mills, in *China Med. Jl.* 1916. Nov. Vol. 30. No. 6. p. 463.)

To ascertain whether the presence of microfilaria in the lungs during the daytime could be ascribed to a condition of chemotaxis for oxygen or carbon dioxide gas, the authors made a series of experiments introducing into sealed tubes of blood of a filarial patient atmospheres of air, pure oxygen and carbon dioxide. The embryos in the tube of oxygen ceased movement in 80 hours while those in carbon dioxide atmosphere only became quiescent after 180 hours. Investigations are in progress to determine whether the condition of the peripheral blood at night coincides with these findings.

R. T. L.

Brohier (S. L.). **Notes on a Fatal Case of Enteritis, probably of Filarial Origin.**—*Report of the Accra Laboratory.* 1915. pp. 27–29. London: J. & A. Churchill.

In the great majority of cases the presence of microfilariae is unassociated with pathological lesions. The author however records a peculiar case in which unusual post-mortem lesions in the bowel are attributed to the embryos of *Filaria bancrofti*. The patient was an inmate of the Accra Lunatic Asylum. On October 13th 1915 he was taken ill with diarrhoea, several pale liquid stools, without evident

mucus or blood, being passed during the day. The disease was associated with marked wasting and anorexia. All efforts to check the diarrhœa were unavailing and death occurred on the fifth day of illness. A post-mortem revealed the following points of special note :-

"There was congestion of the mucous membrane of practically the entire length of the small intestine, but it was in the lower part of the ileum, for a distance of 1½ feet above the ileo-cæcal valve, that the most marked changes were noted. Here the mucous membrane presented a very striking appearance, due to a number of small submucous haemorrhages, varying in size from one-eighth to a little over a quarter of an inch in diameter. These haemorrhages occupied the spaces between the adjacent valvulae conniventes, the valves themselves being free from haemorrhages and appearing to project from a bloody base. The free edges of the valves were covered with a delicate slate-coloured slough of necrosed tissue. This slough was, however, fairly firmly adherent to the subjacent tissue of the valve, and, whilst the most superficial portion came away when a knife-blade was gently passed over it, the greater part still remained attached, presenting an irregular, minute-papillomatous and worm-eaten appearance. On firmer pressure being exerted these minute projections came away, leaving small haemorrhagic points on the free edge of the valve. . . . Smears from scrapings of the bowel showed fairly numerous microfilariae, varying from four to six in each film. Unfortunately I had no opportunity of examining these in the fresh state, as the specimen of the bowel was removed to the laboratory for examination, wrapped in a piece of cloth wrung out in a five per cent. solution of formalin, and consequently by the time they were examined the microfilariae were dead. Sections of the bowel also showed microfilariae in the dilated lymphatic spaces, together with congestion and round-celled infiltration of the mucosa and submucosa, which was most marked in those regions where microfilariae were found."

R. T. L.

von Herrenschwand (Fritz). **Zwei Fälle von subretinalem Zystizerkus.** [Two Cases of Subretinal Cysticercus.]—*Wien. Klin. Woch.* 1916. Oct. 19. Vol. 29. No. 42. pp. 1332–1333.

Intra-ocular cysticercus is exceedingly rare. Von Graefe recorded 90 cases out of 80,000 patients with eye diseases. Hirschberg had in Berlin five in one thousand. Sattler in Leipsic saw only two in 90,000 cases. During the last sixteen years none were met with at the eye clinic, Innsbruck, among 80,000 patients. Lately within a very short period the author had to deal with two cases, both in soldiers. Ophthalmic details and the operative procedure are given. It is stated in each report that the patient was also infected with *Taenia saginata.* [? *T. solium.*]

R. T. L.

Willets (David G.). **A Statistical Study of Intestinal Helminthiasis.**—*Southern Med. Jl.* 1917. Jan. Vol. 10. No. 1. pp. 42–49.

The occurrence of endemic helminth infections in institutions is a matter of considerable interest. The author gives a series of analytical tables compiled from records made by him at the Georgia State Sanitarium during 1908 and 1909. These tables show the relative frequency, severity, age and sex distribution of infections with Ascaris, Trichocephalus, Strongyloides, Ankylostomes and Hymenolepis. A

comparison of his findings with those of Stiles and Garrison is set out thus :—

Table III.

Comparison of Findings at the U.S. Government and Connecticut Hospitals with those at the Georgia Sanitarium.

Parasites.	Government and Connecticut Hospitals.		Georgia Sanitarium.	
	Number.	Per cent.	Number.	Per cent.
Trichiuris	266	7·69	293	23·94
Oxyuris	45	1·30	0	0·00
Hookworm	36	1·04	228	18·63
Ascaris	17	0·49	202	16·50
Hymenolepis	12	0·35	6	0·49
Strongyloides	8	0·23	129	10·54
Taenia	2	0·06	0	0·00

The most noteworthy find is the high percentage of infection with Strongyloides. In one case the infection was very intense. No less than 189 embryos were counted in a single microscopical field. The conditions at the Sanitarium appear to have been favourable for the propagation of Strongyloides and the whipworm and unfavourable for the ankylostome and Hymenolepis. This is illustrated by the figures given on following page.

It is anticipated that a systematic campaign against helminthiasis in institutions like that under consideration would prove that intestinal parasites have an appreciable effect upon the mortality and morbidity of the insane.

R. T. L.

van Liere (Edward J.). **The Intestinal Parasites of Twenty Foreign Students in the University of Wisconsin.**—*Jl. Amer. Med. Assoc.* 1916. Nov. 4. Vol. 67. No. 19. p. 1369.

Ten out of twenty foreign students showed eggs of helminths in the faeces. Of these six had Trichocephalus while the seventh had *Hymenolepis nana*, the eighth *Ascaris lumbricoides*, the ninth *Schistosoma japonica* and the tenth had Hookworm and Trichocephalus. The author is of opinion that there is danger of infection from the foreign students as they, and particularly orientals, are more frequently infected.

R. T. L.

Henao (E.) & Toro Villa (G.). **Parasitismo intestinal.** *Revista Clinica.* Medellin. 1916. Sept. Vol. 1. No. 2. pp. 57–71.

Statistics of the relative frequency of the different species of intestinal parasite met with in the course of coprological observations made on a hundred cases at the San Rafael Hospital of the Antioquia

Table XIV.

Influence of Duration of Institutional Life on Infection with Various Entozoa.

Duration of Institutional Life.	Examined.	Trichiuris.		Hookworm.		Ascaris.		Strongyloides.		Hymenolepis.	
		No.	%	No.	%	No.	%	No.	%	No.	%
30 days or less	500	3	0·60	111	22·20	12	2 40	4	0 80	3	0·60
31 days to 1 year	251	41	16·33	51	20·32	55	21·91	24	9·56	2	0·80
2 to 3 years	146	63	43·15	31	21·23	41	28·08	27	18·49	1	0·68
4 to 6 years	121	68	56·20	23	19·01	36	29·75	32	26·45	0	0·00
7 to 10 years	79	44	55·70	5	6·33	27	34·18	18	22·78	0	0·00
11 to 15 years	57	34	59·65	5	8·77	12	21·05	12	21·05	0	0·00
Over 15 years	70	40	57·14	2	2·86	19	27·14	12	17·14	0	0 00
Admission cases	500	3	0·60	111	22·20	12	2·40	4	0·80	3	0·60
Old cases	724	290	40·06	117	16·16	190	26·24	125	17·27	3	0·41

Railway, and the municipal laboratory at Medellin (Colombia). A percentage table is given :—

	Hosp. S. Rafael.	Lab. Urbano.
Strongyloides	16	9
Taenia	1	3
Ancylostoma	88	48
Trichocephalus	60	76
Ascaris lumbricoides ..	67	66
Ascaris canis	0	14
Oxyuris vermicularis ..	0	8

[The number of new cases infected with the dog Ascaris is especially notable.]

R. T. L.

Soulié (Henri) & Derrieu (G.). **Parasitisme intestinal des enfants des écoles maternelles d'Algérie. Détermination d'un indice parasitaire. Application de cet indice à la mesure de la pureté des eaux de boisson.**—*Bull. Soc. Path. Exot.* 1916. Dec. Vol. 9. No. 10. pp. 795–802.

In thirty-four infant schools [*écoles maternelles*] in thirty different districts of Algeria 49 per cent. of 316 children were found to harbour intestinal worms. These children had been born in the district and had always remained there ; 309 were Europeans or naturalised Jews and 7 were native Moslems. Their ages lay between two and six. One hundred and thirty-four were infected with one species of parasite only. Twenty had two species while one alone was infected with three different forms. The varieties met with were *Ascaris lumbricoides*, *Trichocephalus trichuris*, *Oxyuris vermicularis* and *Hymenolepis nana*.

The whipworm occurred most frequently. It was found in 77 children : alone 64 times, and 13 times in association with other forms. Next in order of frequency was *Hymenolepis nana*. This was present in 64 children, alone 50 times and in association 14 times. Usually the eggs of this form were very abundant, no less than five being seen in a single field of the microscope. *Ascaris lumbricoides* occurred 15 times alone, and 30 times with other parasites. *Oxyuris vermicularis* was recorded in five cases alone and in six cases in association.

As the development of these intestinal nematodes is direct and their spread effected chiefly by water the authors consider that the extent of infection can be taken as an indication of the degree of contamination of water by faecal matter and that the " parasitic index " of the children of each locality would be more valuable as an indication of the purity of the water supply than frequently repeated bacteriological analyses.

R. T. L.

Macfie (J. W. Scott). **A Note on the Provisional Identifications of Worms collected at Accra.**—*Report of the Accra Laboratory.* 1915. pp. 80–81. London : J. & A. Churchill.

In a list of provisional identifications, by Dr. J. W. W. Stephens, of parasites of domesticated animals, it is noted that Cysticercus is a very

common parasite of the pigs slaughtered at Accra. The lungs are infected with *Metastrongylus apri* and the kidney with *Stephanurus dentatus*. *Belascaris mystax* was obtained from a cat. *Hymenolepis diminuta* occurred very frequently in the brown rat. The other entozoa are of no medical significance.

R. T. L.

Gabbi (Umberto). **Sulla maggiore diffusione geografica delle malattie tropicali già esistenti in Italia e sulla presenza di due nuove di esse : la Filariosi e la Bilharziosi.** [Increased Spread of Tropical Diseases existing in Italy with two fresh ones: Filariasis and Bilharziasis.]—*Malaria e Malat. d. Paesi Caldi.* 1916. Sept.-Dec. Vol. 7. No. 5-6. pp. 301–304.

The author tabulates the various tropical affections that have been noted within recent years in Italy and notes the incidence of a single endemic case of filariasis and a recently imported case of bilharziasis from northern Africa.

R. T. L.

Coutant (A. F.). **Chenopodium Poisoning. Report of Case.**—*Jl. Amer. Med. Assoc.* 1916. Nov. 25. Vol. 67. No. 22. pp. 1599–1600.

Amongst about 300 cases of hookworm disease treated in Texas with oil of chenopodium one case of poisoning occurred. The dose used in routine was ten minims on each of three consecutive days. The capsules were taken half an hour before a light breakfast. The other meals were as usual. Following the last dose a dose of salts or castor oil was given after an interval of two hours. The report of the case in which poisoning supervened is given verbatim :—

"The patient was a young man who gave the history and symptoms of severe uncinariasis, and showed the ova in the faeces. Though 21 years of age, he weighed only 95 pounds, was very anaemic, and was so weak that he had not been able to work for several months. He was extremely nervous, and was subject to nervous 'spells,' accompanied by intense headache. He had also had several attacks of recurring malaria during the few months just preceding.

"The patient had taken two doses of chenopodium twenty-four hours apart, or 20 minims in all. On the afternoon of the second day of treatment, ten hours after taking the second dose, he was suddenly seized with severe, griping, cramplike pains in the abdomen, vomiting, intense headache, and nervous twitchings and tremors of the extremities. The temperature rose to 102 degrees, with sweating. The nervous condition progressed in a short time to a state of nervous prostration, and the patient became hysterical and was irrational for several hours. A local physician who was called in by the family found the patient on the verge of collapse—extremities cold and clammy, pulse shallow and rapid, heart weak. He administered strychnin, digitalis and nitroglycerin with the object of improving the circulation, applied warmth to the extremities, etc., and the patient rallied. Five grains of calomel were also administered. The stool resulting from this purgation was blood-tinged and contained much mucus and many hookworms.

"The next morning the patient had another attack, not quite so severe, with intense abdominal cramps, vomiting, nervous symptoms, and temperature of 100·6 F. The patient again became very weak, the heart

rapid and feeble, and more stimulants were given. The patient improved slowly, and was so exhausted that he did not get out of bed for two weeks."

In the comments on this case it is recalled that twelve cases of poisoning have been reported by LEVY in the United States. The smallest dose in these cases was 30 minims. Coutant is uncertain whether his case indicated a constitutional drug idiosyncrasy or whether the baneful results followed upon the general condition of the patient or some undiscovered intestinal lesions which allowed of unusual absorption of the drug.

R. T. L.

HOOKWORM CAMPAIGNS (1915).*

Antigua.†

After the preliminary survey conducted by Dr. Eric MARSHALL from August 1st to November 27th, 1914, arrangements were made to carry on preliminary operations on the intensive plan in the York Valley District. This area, roughly two miles in diameter, includes ten villages, with a combined population of 1,956 persons of whom almost all are negroes. The work commenced on September 15th, 1915, under Dr. P. W. COVINGTON and up to December 31st, 1915 98·2 per cent. of the inhabitants had been examined.

Antigua, 1915.‡

	No.	Per cent.
1. Census	1,956	
2. Examined	1,921	98·2
3. Found infected	524	27·3
4. Given first treatment	432	82·4
5. Cured	284	54·2
5a. (percentage of treated cured 65·7)		
6. Removed from area (or dead)	24	4·6
7. Remaining in area uncured	216	41·2
Not cured for medical reasons 35		
Still to be treated 181		

The percentage of cure following treatment is 65·7.

* For 1914 see this *Bulletin*, Vol. 8. pp. 525–35.

† Report on Ankylostomiasis in Antigua. By E. S. MARSHALL, M.R.C.S., L.R.C.P., D.T.M. & H. 1915. Antigua: Printed at the Government Printing Office.

‡ This and succeeding statistical tables are composite tables drafted by the sectional editor to include information given in separate tables in the original.

In this district only ten out of 413 homes visited were found to be provided with satisfactory latrines. No definite result in the direction of enforcing the installation and proper maintenance of suitable latrines had been attained up to December 31st, 1915.

From Dr. COVINGTON's Report* on Work for the Relief and Control of Uncinariasis in Antigua from August 1st, 1914 to December 31st, 1915, the following additional items of interest are added :—

"*Topography.*—The York Valley District is surrounded on all four sides by hills. These form for it a natural boundary. The valley itself is low-lying and unforested, with only a few streams running through it. Agriculture is the principal industry and sugar the principal crop. There are but few large estates, most of the farming being done on small holdings belonging to the people.

"*Conditions of Life.*—The inhabitants live in scattered villages. In one village there may be a population of only 100 persons, while in the next there may be 600. Between two villages there is often a mile or more of uninhabited territory. Because of this uneven distribution of the population, the district was divided into areas each composed of several villages.

"While the sugar crop is being harvested, many of the people leave their homes and work as labourers on the large plantations. At other times they live on their own small holdings in homes which are little more than hovels. They have no knowledge of hygiene or sanitation. The main water supply comes from open, roadside ponds, not covered in any way and receiving all sorts of surface drainage."

British Guiana (1915).†

Operations reported upon for 1915 were undertaken in two districts : (1) Peter's Hall District. This district has villages and sugar plantations on both sides of one long road. There are few isolated houses. The work was confined to the free population numbering 10,380. Indentured labourers on sugar plantations were excluded, as they were being effectively treated under another scheme.

(2) Belle Vue District lies on the west bank of the Demerara River opposite Peter's Hall. It is about 14 miles long, with valleys and sugar plantations on both sides of a public road. The free population numbered 11,943.

This district lies at a lower level than the high tides, abounds in dense vegetation and is completely inundated during the rainy season. It is one of the most unsanitary districts in the colony.

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* Report on Work for the Relief and Control of Uncinariasis in Antigua from August 1st, 1914 to December 31st, 1915. By P. W. COVINGTON, M.D., Medical Officer in Charge, 1916. New York City : International Health Board.

† Rockefeller Foundation, International Health Commission Second Ann. Rep. Jan. 1st, 1915–Dec. 31st, 1915. [Dr. Wickliffe ROSE, Director-General.] 1916. New York :—Offices of the Commission, 61, Broadway. pp. 76–86.

British Guiana (1915).

	No. of Persons.		
	Peter's Hall District.	Belle Vue District.	Total.
1. Census	10,380	11,943	22,323
2. Examined	9,537	11,533	21,070
3. Found infected	5,590	7,545	13,135
4. Given first treatment ..	5,160	6,743	11,903
5. Cured	4,109	5,930	10,039
Percentage infected cured	73·5	78·6	76·4
Percentage of treated cured	79·6	87·9	84·3
6. Removed from area (or dead)	717 (=12·8%)	697 (= 9·2%)	1,414 (=10·8%)
7. Remaining in area uncured	764 (=13·7%)	918 (=12·2%)	1,682 (=12·8%)
7a. Not cured for medical reasons	160	338	498
Still to be treated ..	604	580	1,184
8. Not located	843	410	1,253

Sanitary Improvement.—Laws are in existence requiring the erection of suitable latrines. In the two districts 6,147 homes were inspected. Of these only 41·1 per cent. were found to be provided with latrines. During the progress of the campaign no less than 1,394 new latrines were erected. In addition to this many other homes were required to improve the latrines to conform to the standard adopted. "Main and interlot drains were cleaned out; vats and barrels screened; dense overhanging bush and unnecessary vegetation cleared away; many unsanitary buildings removed; bakehouses and provision shops cleaned and reconstructed; accumulations of rubbish removed; and ventilation improved." The Surgeon-General reports, "it may be of interest to know that from the Peter's Hall and Belle Vue districts, where the work has been conducted, the number of persons seeking medical relief at the public hospital at Georgetown has been much reduced whereas from the city and from the country districts where the work has not been conducted the number has increased."

Grenada (1915).*

The work was continued in 1915 under Dr. Angus MacDonald. The agricultural pursuits of the people and the widely scattered popu-

* Grenada. International Health Commission (Ankylostomiasis Campaign). Analysis of the Work of a Year, Oct. 1914–Sept. 1915. By the Medical Officer in charge. MS. Report.

lation made a thorough-going house to house visitation and treatment almost impossible. The actual taking of the medicine by the patient was not under the supervision of the nurse. The plan of campaign does not therefore conform in detail either to the established routine of the " dispensary " or of the " intensive " method [see this *Bulletin*, Vol 8, p. 526].

After February 1915 the field of operations was restricted to Mt. Moritz area, embracing about 7,000 acres in the parish of St. George's and the St. David's area, of about 12,000 acres, in the parish of St. David's. Work continued in these areas until July when an area of 6,000 acres contiguous to St. David's and known as St. Andrew's area was opened up. In this last area the work was continued until the end of the year.

These three areas embrace approximately about one-sixth of the population and one third of the total area of the island.

The total population dealt with up to the end of 1915 was 16,001. The earlier records deal with the number of specimens, not of people examined. Many persons were treated who were not recorded as infected. The actual number of those treated to a cure as demonstrated by microscopical examination was 3,346.

The cocoa-growing districts are the chief centres of infection. In the Mt. Moritz area, where the cultivation is largely open, 43 per cent. of the people were infected while in the St. David's and St. Andrew's areas, where dense cocoa cultivation prevails, the average was 67 per cent.

The Medical Officer in charge has submitted to the Governor of Grenada as an official report of his work an analysis covering the period October 1914 to September 1915.

In this report it is noted that hookworm infection is rare in the adjacent island of Carriacou. Out of 68 persons examined four only were found infected and of these two had resided in Grenada, one in Trinidad and one in British Guiana.

As regards Grenada it is stated that the hookworm infection for the entire population dealt with is estimated approximately as 57 per cent., while the rate varies in different areas from 42 per cent. to 70 per cent. It can only be said, however, that ankylostome infection in Grenada is a rare cause of serious specific disease. It is a complication which may and does detrimentally affect the people to an uncertain extent. Even mass infection is consistent with good physical condition. Severe anaemia has not been met with in the hookworm infected save in association with chronic malaria infection. Dyspepsia is general. Cardiac dilatation occurs equally in the uninfected and infected. The " undersized and undeveloped in hookworm countries are not always indicative of ankylostomiasis."

A useful clinical record of 5,792 patients is appended :—

Condition Record.

Total 5,792.

Infected with Hookworm 3,250.			Not infected with Hookworm 2,542.		
Condition recorded.	Total.	No. per mille.	Condition recorded.	Total.	No. per mille.
"Fair"	1,587	490	"Fair"	1,858	730
Anaemia	516	160	Anaemia	491	200
Dilated heart ..	51	16	Dilated heart ..	15	6
Undersized and Undeveloped ..	53	16	Undersized and Undeveloped ..	29	12
Other conditions ..	1,043	321	Other conditions	148	58

This record gives the actual condition recorded of

"people who came for treatment because of some illness, and of others who merely submitted for examination under the scheme of the Campaign. 'Fair' was the highest value recorded and covers all conditions of health consistent with pursuance of daily vocations in the absence of any morbid condition worthy of record. There were 490 per mille 'fair' amongst those infected as against 730 per mille 'fair' of those not infected with Hookworm; indicating a lowered vitality on the part of those infected. Anaemia is recorded of 160 per mille of those infected, and of 200 per mille of those not infected. This points to some widespread anaemia producing factor acting more or less equally on the population whether Hookworm infected or not. 'Dilated Heart' is recorded in 16 per mille of the infected and 6 per mille of the non-infected. The hilly nature of the country and the general burden-carrying type of labour predispose to cardiac dilatation, which the figures suggest is accentuated by Hookworm Infection. The number of those recorded as 'undersized or undeveloped' is 16 infected and 12 not-infected per mille. These figures invite caution in ascribing this condition always to Hookworm Infection even when the patients are infected, but of the 16 who were treated there is record of immediate and rapid development and improvement in condition in at least 12. Several of the non-infected were treated without apparent result.

"Considering the undoubted prevalence of geophagy in some countries and in populations also where Hookworm Infection may be eliminated, it is remarkable how rarely the condition is acknowledged by adults or children, or by parents of their children. It has been recorded in a few cases of children infected with Hookworm and not infected with Hookworm, and who also passed abundant Ascaris ova. There is evidence otherwise to suggest the greater prevalence of geophagy than the records show.

"Among the 321 per mille of infected and 58 per mille of non-infected of whom other conditions are recorded, the chief record in both is dyspepsia with the usual gamut of vague and neurotic symptoms. But amongst those infected there are two signs not here specifically mentioned, which, in my experience, may almost alone be claimed to be pathognomonic of ankylostomiasis.

"They are an expression of eye which it is difficult to describe and a mental condition which gives an appearance of stupidity.

"These appearances are by no means present in all cases of Hookworm Infection, and they are not necessarily present in cases of anaemia which

may be called ankylostomiasis. These conditions of eye and brain are practically always associated and are not to be met with characteristically in those not infected with Hookworm. They appear to result from a delayed reaction time.

"The eye has variously been described as 'Fish Eye,' 'Bead Eye,' 'Anaemic Eye.' Its fixity is, I believe, the factor to which these names owe their origin. It has an opaque, staring look, sometimes associated ith exophthalmos and the vessels of the conjunctiva—not due to obvious anaemia—(Haemoglobin may record 80) are scarcely to be seen. Attempt to direct the movements of the eye is met with difficulty, movements in all directions being obtained only after an appreciable interval of time.

"The mentality is similarly affected by slow reaction. The first impression is often that one is dealing with a fool; a sudden delayed response shows intelligence, and on more careful examination one may find a patient of quite average or over average intelligence suffering from a sluggish mentality that affects all his actions, physical as well as mental. This condition is most satisfactorily removed by the expulsion of the Hookworm. It has been recorded in 50 per thousand of those infected with Hookworm and has been seen much more frequently than is recorded. It has not been recorded of any not infected with Hookworm."

Dutch Guiana (1915).*

On October 15th, 1915, Dr. W. H. Kibler opened a hookworm campaign on the intensive method at the Marienburg Estate on the Commewyne river about ten miles from Paramaribo. The estate has a population of 2,380 persons of whom 1,005 are Javanese, 894 East Indians and 448 blacks. The inhabited district covers less than one square mile.

The results to December 31st, 1915 are :—

Marienburg Estate.

	No.	Per cent.
1. Census	2,380	
2. Examined	2,322	97·6
3. Found infected	1,942	83·6
4. Given first treatment	1,809	93·2
5. Cured to date 31/12/15	492	27·2

Of 201 houses located on the Estate 71·1 per cent. were emptying their sewage into trenches, some of which had water in them during the rainy season only, others only during the period when the sugar factory was working. The remaining houses had no provision of any kind. Up to December 31st, 1915 seven latrines were provided to accommodate 27 houses.

St. Lucia (1915).†

Beginning January 1915 work in St. Lucia was conducted on the general lines of the intensive method as followed in other West Indian Colonies, except that the actual administration of the medicine was

* Rockefeller Foundation International Health Commission, Second Ann. Rep., 1915. pp. 87–90.

† *Loc. cit.* pp. 98–107.

not under the direct supervision of a nurse. Work during the first six months was limited to the Cul-de-Sac Valley and in the latter half of the year to the Castries Valley. The former area is almost entirely rural. Dense masses of tropical vegetation grow throughout the area and there is, on the more level lands, extensive cultivation of sugar-cane intermixed with cocoa and lime crops. Ciceron is the only village. The Castries valley area is urban and suburban; more than half of the people live in the town of Castries.

St. Lucia (1915).

	No. of Persons.			
	Castries Valley.	Cul de Sac Valley.	Total.	Per cent.
1. Census	4,648	3,501	8,149	
2. Examined	4,501 (96·8%)	3,423 (97·8%)	7,924	97·2%
3. Found infected.. ..	1,598 (35·5%)	2,838 (82·9%)	4,436	56%
4. Given first Treatment..	1,488 (93%)	2,618 (92·2%)	4,106	92·6%
5. Cured	1,119 (70%)	1,058 (37·3%)	2,177 (49·1%)	
6. Removed from area (or dead)	170	133	303 (6·8%)	
7. Remaining in area uncured..	309	1,647	1,956 (44·1%)	

The failure to cure the majority of cases noted as remaining in the district uncured was due to the fact that these persons were not persuaded successfully during the period under review to continue treatment to a cure. Only 220 persons refused to accept first treatment.

Sanitary Improvement.—"It has never been the custom in St. Lucia to build latrines or even to make any general use of commodes. The almost invariable practice of the native population is to use earthenware utensils of varying kinds and sizes, the contents of which are either dumped into a covered pail for subsequent disposal or the vessel itself covered with an ill-fitting piece of wood and put aside until, under cover of darkness, its contents can be thrown away. It has not been found an easy matter to overcome this practice. Even in some cases where the people have been persuaded to install latrines, these are used only as a place into which vessels may be emptied.

"Within the town of Castries water sewerage is impracticable; consequently a system of removal by pails is in use. A sewage barge anchors nightly in the river, and all night long the inhabitants parade to the barge with their receptacles of sewage matter. On the nights of November 2–3 and 3–4, 1915, both fine and clear, the number of receptacles taken to the barge was 438 and 560, respectively—an average of 499 per night. By the census of 1911 the population of Castries was 6,266; the number of inhabited houses, 1,329. Assuming that all the receptacles were brought from homes within the limits of the town, this means one receptacle to

every two and one-half inhabited houses, or one to every twelve and one half persons, indicating that at only 40 per cent. of the homes within the town limits is effort made to secure a satisfactory disposal of the sewage. But there are many householders within or near the out-skirts of the town who claim that they also make use of the sewage boat; in the area where work was conducted, twenty-seven families made this claim. If the number of receptacles taken to the boat by these out-of-town families should be deducted from the average of 499, the number of houses or persons per receptacle within the town limits would be still higher."

Between September 1st and December 31st, 1915, each householder was interviewed personally and an effort was made to persuade him to build a latrine. The people took kindly to the idea. No legal prosecutions proved necessary. By the end of the year out of 419 houses in the suburban area of Castries no less than 119 houses were provided with adequate means of sewage disposal, while in 62 other homes latrines were in course of erection.

St. Vincent (1915).*

The hookworm campaign in this colony was commenced on May 1st, 1915. The work was carried out under the direction of Dr. W. P. Jacocks and followed the "intensive method." By the end of the year operations had been completed in the districts Calliaqua and Belair. The former is located three miles from Kingstown, its base extends four miles along the sea coast and its other boundaries meet three miles inland at Belmont. Practically all the land is under cultivation. In addition to the town of Calliaqua there are a number of villages. The Belair district adjoins the Calliaqua district but is wholly inland. Most of the inhabitants live in one or other of seven small villages. There is no indentured labour.

	No. of Persons.			
	Calliaqua.	Belair.	Total.	Per cent.
1. Census	2,544	1,281	3,825	—
2. Examined	2,544	1,278	3,822	99·9%
3. Found infected	801	875	1,676	43·9%
4. Given first treatment ..	773	817	1,590	94·9%
5. Cured .. .. Percentage of infected cured 80·5.	627	723	1,350	84·9%
6. Removed from area (or dead)	0	2	2	
7. Remaining in area uncured (19·5% of infected persons) Under treatment .. 219 Medical reasons .. 75 Refused treatment 30 Inaccessible .. 2			326	

* *Loc. cit.* pp. 108–114.

Sanitary Improvement.—In the area worked there were 736 homes, of which only 86, i.e., 11·7 per cent. had latrines. By the end of the year 348 new latrines were built.

Dr. W. P. Jacock's Report* gives the following interesting figures as to per capita cost. In the work conducted in St. Vincent up to December 31st, 1915, a total of $4,118.44 was expended. The number of persons examined was 3,822 and those treated were 1,590. From this the cost per person examined is found to be $1.08 and the cost per person treated $2.59.

A useful table is also given showing the number of treatments found necessary to effect cures.

Total persons cured.	1,350.
Cured by 2 treatments	623 = 46·1%
,, 3 ,, ...	376 = 27·9%
,, 4 ,, ...	210 = 15·6%
,, 5 ,, ...	76 = 5·6%
,, 6 ,, ...	43 = 3·2%
,, 7 ,, ...	17 = 1·3%
,, 8 ,, ...	3 = 0·2%
,, 9 ,, ...	— —
,, 10 ,, ...	2 = 0·1%

Trinidad (1915).†

The "Dispensary operations" previously conducted in this colony were replaced at the commencement of 1915 by a dispensary modification of the "intensive method." The work was supervised by Dr. C. G. H. Campbell and Dr. B. E. Washburn. The area first selected is located near San Fernando and embraces seven villages including Ste. Madeleine. On May 15th, 1915, however, this was suspended and operations under the official "Intensive Method" were begun around the village of Tunapuna, about nine miles from Port of Spain. The area is densely populated; about 60 per cent. of the inhabitants are Creoles and 40 per cent. East Indians; it is about two and a half miles long and less than a mile wide. The territory was divided into 18 districts. Work had been completed in 13 of these by the end of the year, the results obtained are shown in the following table.

* Report on Work for the Relief and Control of Uncinariasis in St. Vincent from August 16th, 1915, to December 31st, 1915. By W. P. Jacocks, M.D., Medical Officer in Charge. 1916. New York City: International Health Board.

† Rockefeller Foundation International Health Commission, Second Ann. Rep., 1915. pp. 115–122.

Trinidad, 1915.

	No. of Persons. 13 districts of Tunapuna.	Per cent.
1. Census	6,498	—
2. Examined	5,943	91·5%
3. Found infected	4,000	67·3%
4. Given first treatment ..	3,632	90·8%
5. Cured .. .. (Percentage of infected 67·8)	2,712	47·7%
6. Removed from area (or dead)	530	13·3% of infected.
7. Remaining in area uncured .. Refused .. .. 536 Medical reasons .. 220	758	19% of infected.

Sanitary Improvement. In the Tunapuna district there are 1,146 homes; 97·3 per cent., i.e., all but 31, now have sanitary latrines and efforts are being made to have latrines erected at the remainder.

Costa Rica (1915).*

Operations on the dispensary plan were commenced by Dr. L. Schapiro on April 8th, 1915, in succession to Dr. H. R. Carter. During the year work was extended to include the six provinces Alajuela, Limon, Cartago, San José, Heredia, Puntarenas and Guanacaste. Only the most favourable points of attack were selected. The whole area was only partially covered and the work was not concluded in any province.

During the year 57,979 specimens were examined; of these 34,840 or 60·1 per cent. were found to be positive. First treatment was administered to 23,597 persons.

Sanitary Improvement.—An inspection of 8,261 homes was made. At the first visit only 867 or 10·5 per cent. of these were provided with latrines. During the year the number rose to 1,256 or 15·2 per cent.

Guatemala (1915).†

Dr. W. H. Rowan commenced active work on March 15th, 1915, as head of the Department of Uncinariasis. Operations almost identical with the intensive method were initiated but microscopical re-examination for determining cures was not made a feature of the work so that figures are unavailable as to the number of persons remaining uncured in each district.

By the end of the year 87 coffee estates containing a population of 28,090 persons had been dealt with. 25,587 or 91·1 per cent. were microscopically examined and 15,001 or 58·6 per cent. of these were found infected. First treatment was given to 13,783 persons, i.e., to 91·9 per cent. of those found infected.

Sanitary Improvement.—Only four latrines were found at the homes of the labourers during the year. There were 185 latrines on the estates. 1,048 new latrines for labourers' families were constructed by the Department at the cost of the estate owners and provided accommodation for about one half of the population of the estates.

* *Loc. cit.* pp. 123–131.
† *Loc. cit.* pp. 132–140.

Nicaragua (1915).*

Active work commenced on October 1st, 1915, and has been confined to the Department of Chinandega. During the month dispensary operations were carried out on San Antonio, the largest sugar plantation in Central America. It is situated about four miles from the town of Chichigalpa. During November work was started in the town of Corinto on the Pacific Coast. In December headquarters were established at Chinandega town. In November and December some preliminary survey work was also done in the department of Managua.

	San Antonio.	Corinto.	Chinandega.	Managua.
Microscopically examined	941	1,172	976	2,340
Found infected ..	673 (71·5%)	940 (80·2%)	480 (49·2%)	588 (25·1%)
Given first treatment	399	592	362	258

Sanitation.—A survey of 469 homes in the town of Corinto showed that only 185 or 49·1 per cent. had latrines of any kind and of these 142 were of the open-back type entirely inadequate for preventing soil pollution.

*Panama.**

Operations in Panama follow the dispensary plan, but whenever practicable treatments are followed up and re-examinations made for determining cures. The sparseness of the population, the difficulties of travel and communication, and the absence of large towns or estates giving employment to hundreds of people seem to make the dispensary method the better way of providing relief. Up to December 31st, 1915, work had been carried out in fifteen districts of seven provinces of Panama. This area formed 30 per cent. of the total area of the country and contained 35 per cent. of the total population. The work is not yet completed.

Dispensary Work, 1915.

	Provinces.					Total.
	Panama.	Bocas del Toro.	Colon.	Cocle.	Herrera.	
Microscopically examined ..	6,793	5,879	1,379	7,797	3,162	25,010
Found infected	4,188	3,240	1,144	5,879	2,439	16,890 (67·5%)
Given first treatment ..	3,963	3,024	966	4,924	2,041	14,918 (88·3%)

* *Loc. cit.* pp. 141–145.
* *Loc. cit.* pp. 146–151.

Both in percentage and degree of infection the natives along the Atlantic Ocean and in the foothills of the mountains on the Pacific side, where the dry season is not well defined and the people are engaged mainly in agriculture, have been found to suffer most.

The infection ranges from 85 to 95 per cent., and the haemoglobin index is below 60. On the Pacific side, where there is no moisture for three months in the year, the people of the plains have a percentage of infection below 65 and an average haemoglobin over 70.

Sanitary Improvement. Elementary sanitation is one of the greatest needs. There are few latrines of any description and these are a menace rather than a protection. During the year about one half of the school houses of the Interior have been equipped with latrines.

Egypt (1915).*

Owing to the war the work of two travelling hospitals established on September 5th, 1914, at Belbeis and at Minia-el-Qamh was temporarily abandoned on April 8th, 1915. From January to April, 1915, a survey was conducted in Assiut; 4,411 persons were examined and 2,018 i.e., 45·7 per cent. were found infected. The survey was confined to men and boys. A very considerable difference was found to exist between the infection in the large towns and in the country villages. In the former 22·7 per cent. of the boys were infected, in the latter it was 51·1 per cent., while in Assiut the capital town of the province only 4·4 per cent. of the boys were infected. The statistics of the hospital dispensary work in Sharqia do not give the figures for the year 1915 separately. It is noted that from December 13th, 1913, up till April 8th, 1915, altogether 20,865 persons were microscopically examined and 59·7 per cent. were found infected. All infected persons were housed and fed in the travelling hospitals until the full course of treatment was completed. "Many of them come from hundreds of miles to receive the benefit of treatment, some floating down the Nile on rafts from remote sections of Upper Egypt."

*Notes on Diagnosis and Treatment of Hookworm Infections.**

Technique of Examination.—During 1915 a series of experiments was made in Trinidad and British Guiana to determine the value of the centrifuge as an aid in the correct diagnosis of ankylostome infections. The results are strikingly similar and go far towards establishing a correct technique of microscopical examination. By combining the examination of a number of ordinary smeared slides with that of a number of smeared slides made after centrifuging the specimen an improvement of approximately 11 per cent. was obtained over the ordinary smear slide process.

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* *Loc. cit.* pp. 152–158.

* *Loc. cit.* pp. 166–173.

TABLE I.

Trinidad and British Guiana—Intensive Work: Comparison of Results of Microscopic Examination with and without Use of Centrifuge.

Country.	Smeared Slide Method: Without Use of Centrifuge.			Combined Method: Smeared Slides and Centrifuged Smeared Slides.			Difference in Favor of Combined Method With Use of Centrifuge.	
	Specimens Examined.	Specimens Positive.	Percentage Positive.	Specimens Examined.	Specimens Positive.	Percentage Positive.	Specimens Positive.	Percentage Positive.
Total ..	2,134	1,049	49·2	2,134	1,277	59·8	228	10·6
Trinidad ..	1,434	741	51·7	1,434	895	62·4	154	10·7
British Guiana	700	308	44·0	700	382	54·6	74	10·6

In Trinidad the results of the test led to the adoption of the examination of two smeared slides before centrifuging, and two after, as the routine method of diagnosis. In British Guiana five to eight smeared slides are examined before centrifuging and five after. For examination after treatment this process is reversed. It is doubtful however whether the examination of so many smears is justified by the results obtained.

In British Guiana a series of experiments was carried out to determine whether or not the thorough examination of one specimen following treatment is sufficient for demonstrating cure and what interval of time should intervene after the last treatment. Ninety-nine cases which had received only two treatments and which had been pronounced cured, on subsequent microscopical examination of one specimen, were re-examined again with the aid of the centrifuge after the lapse of another month. In six cases only were ova detected.

*Treatment.**—One treatment for ankylostomiasis seldom effects a cure. Two treatments usually cure about half of the infected persons treated. Those not so amenable are stated to be those in whom the infection is of long standing or persons in whom the infection is very heavy.

In most of the campaigns thymol is regularly used. This is administered in capsules preceded and followed by Epsom salts. The procedure adopted is as follows:—

"The patient is instructed to take little or no supper on the evening before the thymol is to be administered. As early at night as is convenient

* *Loc. cit.* pp. 173–185.

he takes a dose of Epsom salts. The next morning, as early as the salts have acted half the number of capsules of thymol prescribed for the whole treatment is taken. . . . Nothing is eaten on the day the capsules are taken until the final dose of Epsom salts has acted well. A little water or strong coffee, without milk, alone is allowed. . . . Gravy, butter, milk, all alcoholic drinks and patent medicines, which generally contain alcohol, are forbidden on the evening before and on the day of treatment. . . . The patient is advised to lie on the right side for at least half an hour after taking each dose of thymol."

The dosage usually administered is tabulated.

Age in Years.	Grains.	Grams.	6 a.m.	8 a.m.
1 to 5	7·5	0·5	½ dose	½ dose.
5 „ 10	15	1	½ dose	½ dose.
10 „ 15	30	2	½ dose	½ dose.
15 „ 20	45	3	½ dose	½ dose.
20 „ 60	60	4	½ dose	½ dose.
60 upwards	45	3	½ dose	½ dose.

In the absence of hospital conditions the dosage is usually from ten to twenty per cent. less than indicated above. The dose is determined by the apparent and not the actual age of the patient. Experiments in Trinidad during 1915 showed that whereas among 325 cases treated with pure thymol finely powdered only 12·6 per cent. were cured by two treatments, of 1,112 persons treated with finely pulverised thymol mixed with *equal parts of sugar of milk* 49·1 per cent. were cured by two treatments.

During 1915 experiments were made with oil of chenopodium as a substitute for thymol. In Guatemala it was used in more than 9,000 cases and was reported to be fully as efficient as thymol and less trying to the patient, permitting a subsequent treatment within four days. The only untoward symptom noted was temporary deafness in two children. The maximum doses used are tabulated here. They were given in one time or in halved doses with an interval of one or two hours.

No noticeable difference in result was seen.

Age in Years.	Drops.	Age in Years.	Drops.
4	5	13	20
5	7	14	21
6	10	15	22
7	11	16	24
8	12	17	25
9	14	18	27
10	15	19	28
11	16	20 and over.	30
12	18		

The results in Nicaragua and Costa Rica are also reported as excellent and no untoward symptoms were observed. In Trinidad however Dr. Washburn found chenopodium less effective. He reports that "in all of the cases treated with oil of chenopodium in Trinidad unpleasant symptoms, such as nausea, vomiting, weakness, dizziness, etc. were much more marked than with thymol," and its continued use in a district "alarmed the people and made them afraid to take further treatment of any kind."

Helminthological Notes.

*Nigeria.**

Ankylostome Survey.

	Total Cases Examined.	Percentage Infected.
Calabar	66	97%
Okigwi	43	97%
Agbor	57	89%
Udi	72	81%
Badagry	59	69%
Okwoga	63	65%
Ibadan	200	60%
Lagos gaol	50	48%
Benin City	139	43%
Degema	35	31%
Opobo	100	22%
Bonny	100	20%
Warri	104	18%
Total	1,088	52%
Yaba Lunatic Asylum and Native Staff Medical Institute	136	98%

Dr. Maclaine found that although infection is general at Ikot-Epene severe cases of anaemia were practically unknown. He saw no cases of the disease during 1915 except in some prisoners returned from Port Harcourt, in whom the strain of severe labour (railway work) had been the predisposing factor. Dr. Jackson Moore believed that fully 60 per cent. of the cases at Ibadan which showed ova in the stools appear in good health, and they did not complain.

Dr. Macfarlane at Opobo formed the opinion that ankylostome ova were generally found in the anaemic and flabby looking. He considered it almost safe to diagnose the presence of the parasite without a microscopical examination, simply by the appearance of the individual. He also stated that the appearance of the people in the Opobo district suggested that many of them suffer from the ravages of the disease.

The opinions quoted above are those of medical men who have had a large experience over a number of years in Nigeria. Summarising generally it may be said that severe cases of ankylostomiasis are uncommon, but that in certain districts a certain amount of anaemia occurs, probably due to the presence of the worm.

Egypt.†

The following useful information regarding the incidence of urinary bilharziasis in Upper Egypt is taken from Dr. MacCallan's Report.

* Annual Medical and Sanitary Reports of the Northern and Southern Provinces for the Year ending 31st December, 1915.

† Report on Ankylostomiasis Survey, Assiut Province, 1915. By Major A. F. MacCallan, R.A.M.C., MS. Report.

ASSIUT PROVINCE.

[Urinary] Bilharzia.

Police Area.		No. Examined.	Infected.	Per cent. Infected.
(1) Assiut	Town ..	301	4	1·3
	District ..	505	6	1·2
(2) Manfalut	Town ..	100	1	1
	District ..	505	22	4·3
(3) Derrut	Town ..	100	2	2
	District ..	500	126	25·2
(4) Mallawi	Town ..	100	24	24
	District ..	500	193	38·6
(5) Abnub	Town ..	100	3	3
	District ..	500	11	2·2
(6) Abu-Tig	Town ..	100	3	3
	District ..	500	19	3·8
(7) Badari	Town ..	100	10	10
	District ..	500	19	3·8
Total		4,411	443	10

MALARIA.

PUNJAB. **Report on Malaria in the Punjab during the Year 1915, together with an Account of the Work of the Punjab Malaria Bureau.** [Col. H. HENDLEY, M.D., K.H.S., I.M.S., Chief Malaria Medical Officer, Punjab.]—7 + xxxi pp. With 3 charts and 5 maps. 1916. Lahore: Printed by the Superintendent, Government Printing, Punjab. [Price Rs.2–4–0 or 3*s.* 4*d.*]

As an inevitable consequence of the War there has been no continuity in the administration of the Punjab Malaria Bureau, which is now as a temporary measure in the hands of the Inspector-General of Civil Hospitals. The Report is in the main a brief commentary on the graphic statistical records, which include three charts illustrating fever mortality by quotannual series, month, and season, and five maps showing relative intensity of malaria (as inferred from "fever" mortality and periodic spleen-censuses) by administrative geographical divisions. The Report states that in the year 1915 there was no epidemic of malaria in the Punjab and that the deaths from "fevers" aggregated 284,784, a rate of 14·72 per mille, the annual average of the last 48 years being about 350,000, but it draws attention to the fact that the raw material of these statistics is very largely derived from the village watchman, who though he may know what belongs to a watch has no need of such vanity as nosology. The fever mortality was again highest in the district of Muzaffargarh, and high in all the districts lying immediately east of the Indus. The districts between the watersheds of the Indus system and the Ganges system again show a comparatively low mortality. In the districts between the watersheds of the Ghaggar and the Jumna the mortality was very much less than in the year 1914.

A remarkable feature of the spleen-census maps is that in 19 out of the 26 districts the spleen-index is very much lower in November, when fever mortality is on the increase, than in June, when the mortality is declining. The only districts in which the spleen index is consistently high are Kangra, Montgomery, Muzaffargarh, Mianwali, and Shahpur, which may probably therefore be regarded as the most formidable endemic areas.

In the laboratory a few experiments were made with larvicides, and many individual mosquitoes were examined for infection. Hundreds of *A. rossi* were dissected, without result, but it is not stated whether the individuals dissected represented all seasons and many localities.

A proposal is mooted that all schools should be supplied with specimen-tubes containing mosquitoes of different kinds; and yet, for aught we see, they are as sick that surfeit with too much as they that starve with nothing.

A. Alcock.

RICHARDSON (Q. H.). **The Shatt-el-Arab River, with Special Reference to Malaria.**—*Jl. Roy. Nav. Med. Serv.* 1917. Jan. Vol. 3. No. 1. pp. 33–37.

The author gives an interesting sketch of the river and its surrounding flats, and a concise record of his experience both therapeutic and preventive in dealing with malaria. About 87 per cent. of the cases

affecting the ship's company were benign tertian, the remainder being subtertian. Mosquitoes were not seen in January, February and March.

In the treatment of cases quinine was given to the extent of 20 gr. daily for the first three days, 10 gr. daily for the next three days, and then 5 gr. daily for a week; this being followed by a regular amount of quinine daily for a term depending chiefly on season.

For preventive purposes 20 gr. of quinine weekly to each member of the ship's company was found to be insufficient, but one gathers that 30 gr.—i.e., 5 gr. daily at breakfast-time on six days of the week—was successful.

Screening a ship (against mosquitoes) in such a suffocating climate is out of the question. Mosquito-nets were used, and for protecting men at mess between decks smouldering katol sticks were found effective. The author adds that these sticks are regularly used in the ships of the Royal Indian Marine.

A. A.

Swellengrebel (N. H.). **Quelques notes sur la distribution géographique des anophélines et du paludisme, à Sumatra.**—*Ann. Inst. Pasteur.* 1916. Nov. Vol. 30. No. 11. pp. 593–599.

This is a suggestive paper, the author utilizing the experience acquired in Sumatra to point several albeit somewhat trite morals: namely that those who practice in malarious countries should make a very exact and exhaustive study of the local anopheline fauna; that entomologists should assist by simplifying nomenclature and setting specific features in strong relief, and that generalisations respecting malaria-susceptibility should be made with infinite caution, seeing that a species (the author instances *A. maculatus*) which in certain conditions is a dangerous carrier, may in other conditions be quite innocuous.

As regards matters of fact, the author informs us that the Anopheles of the plain of Deli are *rossi*, *ludlowi*, *albirostris*, *leucosphyrus*, *sinensis*, *barbirostris*, *albotaeniatus*, *umbrosus*, and *kochi*. That at Deli itself malaria is insignificant, though along the littoral, where *A. rossi* and *ludlowi* are prevalent, it may be rife. That at Médan, in the interior, although *A. sinensis* is common, fever among Europeans is not known. That on a certain Deli plantation, where the only species found is *A. leucosphyrus* malarial fever has recently increased [it is noteworthy that Roper in North Borneo elicited somewhat the same circumstantial evidence against this species (this *Bulletin*, Vol. 5, p. 308)]. That at Sibolga, on the west coast of the island, where *A. ludlowi* is the commonest species, malaria is momentous and the splenic index extremely high.

A. A.

i. Braun. **Le paludisme au Maroc en 1915.—Maroc occidental.**—*Arch. de Méd. et de Pharm. Milit.* 1916. Nov. Vol. 66. No. 5. pp. 593–645. With 5 charts & 2 maps.

ii. Sicard. **Le paludisme au Maroc en 1915.—Maroc oriental.**—*Ibid.* pp. 646–654. With 2 charts.

i. This is an interesting report, but as it is of the administrative species there is not much to take hold of. It shows that malaria is

generally endemic in western Morocco, owing to the habits of a nomadic population which in its extensive wanderings is accustomed to sojourn at certain seasons in marshy places where pasturage is assured. The disease however is not, in the opinion of the local government, sufficiently burdensome to justify the enormous expense of a radical cure by approved Panama methods.

Owing to the prolongation of the spring rains the year 1915 was malarious more than normal. Among the troops there were 4,977 admissions, 66 per cent. of the cases being benign tertian, and 34 per cent. sub-tertian. The mortality was 8·08 per mille of cases, 0·6 per mille of strength. More than 17 per cent. of the cases occurred in August; but July, September, and October were only a few degrees less malarious; the least malarious months were February and March; but January, April, and May were only a few degrees worse. The author believes thoroughly in quinine.

The general principles of prevention are ably discussed; practically the sanitary service was limited to quinine prophylaxis, which apparently was not generally carried out with the enthusiasm begotten of faith.

A good deal more than half the report deals with the distribution of malaria by political sub-divisions and districts.

ii. This report also is mainly of departmental interest. The author mentions the frequent rains of latter winter and early spring as favouring malaria, and speaks of the difficulty of the task of abolishing the thousands of ponds where Anopheles breeds. In the neighbourhood of military posts, however, breeding-places were treated by the various approved methods. Screening of doors and windows was too often rendered futile by negligence and even by deliberate destruction, and quinine prophylaxis was not easy to carry out even under careful supervision.

A. A.

Armand-Delille (P.), Paisseau (G.) & Lemaire (H.). **Le paludisme de première invasion observé en Macedoine pendant l'été 1916.**—*Bull. et Mém. Soc. Méd. des Hôpit. de Paris.* 1916. Oct. 26. 3 ser. Vol. 32. No. 27–28. pp 1569–1582. With 8 charts.

The authors consider that from the epidemiological standpoint Macedonia is comparable with a tropical malarious country; there is the same abundance of Anopheles, and the same prevalence of crescents in the blood of the indigenous human carriers.

In the French Macedonian forces, in 1916, the predominant form of malarial fever was subtertian; benign tertian was observed in June, but quartan was exceptional and occurred only in the Algerian quota.

The conspicuous clinical manifestations were not typically malarial, but were rather symptomatic of gastro-intestinal derangement, with a temperature slightly oscillating about 39° C. (102·2° F.) for three or four days, followed by lysis even when quinine had not been given.

The authors comment upon the protean modifications of malarial fever in Macedonia, exemplifying their generalizations by clinical abstracts. The following types are instanced:—The Typhoid, which apart from examination of the blood might be assigned to gastric fever, or to typhoid mollified by vaccination. The Pernicious, characterized by rapid anaemia, the malarial symptoms being obscured. The

Pernicious Apoplectic, sudden in onset, with loss of consciousness, suggestions of hemiplegia, and convulsions. The Pernicious Meningeal, with semi-coma, tetany and convulsions. The Delirious, which may also be associated with the apoplectic and comatose types. The Algid or Choleriform, characterized by all the signs and symptoms of derangement of the suprarenal bodies; this may be an isolated type, or may be connected with any other pernicious type; in one instance it was a complication of benign tertian.

The authors also separate various forms of masked malaria ("larval malaria") as follows:—Profound anaemia with evanescent oedema. The Haemorrhagic, with purpura, petechial eruptions, ecchymoses and uncontrollable epistaxis. The Icteric, without haemoglobinuria. The Suppressed Adrenal, with vomiting and abdominal pain suggesting appendicitis. The Nervous.

Among complications of malaria the authors observed, fairly often, in grave cachectic cases, a double parotiditis.

The authors, being sufficiently occupied with their investigations in the laboratory, did not concern themselves with treatment and the quinine problem. They state, however, on the authority of M. Abrami, that large doses of quinine given at the very outset are necessary to sterilize the blood and to forestall secondary symptoms, and that in pernicious cases large intravenous injections of quinine and adrenalin saved a great number of lives.

A. A.

Trask (John W.). **Malaria. A Public Health and Economic Problem in the United States.**—*Public Health Rep.* 1916. Dec. 22. Vol. 31. No. 51. pp. 3445–3452. With map.; and *Amer. Jl. Public Health.* 1916. Dec. Vol. 6. No. 12. pp. 1290–1297. With a map.

This is a well-considered exhortation upon the text that wide and exact malarial surveys are essential both to the health and to the commercial prosperity of communities. The following artless words from the mouth of a mill manager are quoted by the author as showing that even the practical man is getting some glimmerings of this matter: "The money spent in anti-malaria work here has paid the quickest and most enormous dividends I have ever seen from any investment, and after having had our experience I would if necessary do the work over again if I knew it would cost ten times the amount."

A. A.

Carter (H. R.), Le Prince (J. A. A.) & Griffitts (T. H. D.). **Impounded Water Surveys in Alabama and South Carolina during 1915 to determine its Effect on Prevalence of Malaria.**—*U. S. Public Health Service. Treasury Dept. Public Health Bull.* No. 79. 1916. Sept. 34 pp. With 3 maps.

This report describes very fully the results of much methodical and discriminative observation. The impounded waters referred to are good-sized sheets of water retained by dams. The objects of the survey were, among other things, to determine the Anopheles fauna and its seasonal specific composition, to investigate its origin, whether carried in by affluent streams or otherwise, to examine generally the conditions of its existence and particularly to watch any biological

conditions (e.g., state and distribution of aquatic vegetation, predominance of any specific aquatic plant) that might exert an influence on Anopheles larvae or even on a particular species of larva. The authors of course take note of many other circumstances that are generally known to favour or to check Anopheles larvae, but they consider that the exact study of the influence of the aquatic flora may prove to be important. They also pay attention to the flight of Anopheles and to their specific occurrence in houses. For suggestive ideas the report must be commended to general attention.

A. A.

O'Connell (Mathew D.). **The Meteorology of Malaria. Malarial Fevers in England.**—*Jl. Trop. Med. & Hyg.* 1916. Dec. 15. Vol. 19. No. 24. pp. 285–286.

In an antecedent paper [see this *Bulletin*, Vol. 8, p. 33] the author advocated, by rather operose dialectics, the view that the emancipation of England from malaria is due not to the repression of Anopheles, but to the decreased atmospheric humidity that has followed drainage in the malarious tracts. The present paper is another example of the "high *priori*" method.

The author takes it for granted that a high temperature and a high degree of humidity of the atmosphere are together *per se* a cause of pyrexia, and he finds the verification for this assumption in the statistics of the Departmental Committee on Humidity and Ventilation in the Cotton and Linen-Weaving Sheds, and in the incidental observation that his own temperature rose (a rise of from 0·6° to 1·1° Fahr.) on two of three occasions when he entered an artificially heated and moistened glasshouse. It would have been more satisfactory to have tested it by observations of residents in tropical plains during the fine intervals of the rainy season, or even by observing the extraordinary fluctuations of body-temperature that take place during the ordinary working-day of an ordinary medical man [the reviewer has made such observations of himself] at any season.

In this paper the author by study of the meteorological records of Greenwich for the month of August, 1843, in comparison with the Departmental statistics quoted above, is satisfied that these records can be resolved into definite periods when the meteorological conditions at Greenwich were such as would cause pyrexia, and definite intermissions when they would not—these periodic fluctuations synchronising with simple malarial types. The next step is to suggest a possible connection between these computations and the statement that malarial fevers were quite common in England prior to the year 1853. Were these malarial fevers, the author asks, caused by atmospheric conditions such as those prevalent at Greenwich in August, 1843?

A. A.

Paisseau (G.) & Lemaire (H.). **Accès pernicieux palustres et surrénalites aiguës.**—*Bull. et Mém. Soc. Méd. des Hôpit. de Paris.* 1916. Oct. 26. 3 ser. Vol. 32. No. 27–28. pp. 1530–1545.

While far from contending that all acute pernicious developments of malaria are connected with pathological changes in the suprarenal

bodies the authors consider that a particular concurrence of symptoms, commonly found in algid or asthenic cases, is a distinctive indication of suprarenal insufficiency. The coincident symptoms are vomiting, diarrhoea, epigastric and lumbar pains, asthenia, the phenomenon of the white line, and above all an arterial tension so effete that the least pressure obliterates the pulse. The signal symptom—exhausted arterial tension unaccompanied by any change in the rhythm of the heart—though usually associated with algid symptoms, may also appear in the other types of pernicious malaria.

An abstract of the authors' opinions has already been summarized in this *Bulletin* [Vol. 9, pp. 72–3]; in the paper at present under reference their theorem is elaborated and the post-mortem and other evidence in support of it is given in very ample and precise detail.

A. A.

Paisseau & Lemaire. **De l'insuffisance surrénale dans le paludisme.** —*Presse Méd.* 1916. Dec. 4. Vol. 24. No. 67. pp. 545–547.

Here the authors present in a condensed and systematised form their generalisations on the subject of renal insufficiency in malaria. They define (see above) an adrenal complication or nexus (*syndrome surrénal*) of frequent occurrence in malarial cases; and this syndroma either may be so tumultuous as often to overwhelm the normal onset of the disease, or may issue, sometimes gradually, sometimes rapidly, from the ordinary symptoms. In the sudden and acute cases the authors consider that their conclusions are well supported by post-mortem evidence.

Of the sudden (*suraigu*) concourse of adrenal symptoms three varieties are discriminated; the comatose, the algid or asthenic, and the choleriform.

In the comatose cases a man on duty, or a wounded man, falls insensible without any warning; his pulse is found to be incredibly soft; his temperature, risen at the outset to 40° C., falls in a few hours below normal, and death soon supervenes.

In the asthenic cases, perhaps, an ordinary malarial paroxysm culminates in a very high temperature, delirium and other nervous troubles, and intractable vomiting; suddenly the temperature drops below normal, diarrhoea occurs, and the patient collapses.

The choleriform variety begins with profuse diarrhoea, intense cramps, and incessant vomiting; here the parasitism of the blood is extreme.

In all these cases of sudden adrenal insufficiency post-mortem examination discloses characteristic lesions of the suprarenal bodies; sometimes the cortex is grey and the medulla white, and there is cellular degeneration in every part; at other times the colour of the whole organ is reddish grey, and there are many minute haemorrhages and thromboses.

Acute adrenal symptoms occur in malarial cases several weeks from infection. After persistent malaise, headache, and anaemia there is a sudden rise of temperature, with vomiting, diarrhoea, and lumbo-abdominal pains, followed by a sudden fall of temperature below

normal. The heart and liver are normal, but the spleen is enlarged and arterial tension is reduced. In a fatal case the same degenerative changes were found in the supra-renal bodies.

Subacute adrenal insufficiency has a gradual origin in an ordinary case. The symptoms are, anaemia, anorexia and nausea, asthenia, diminished arterial tension, and often lumbar pain. Subacute cases may continue into a chronic stage, of which general pigmentation is one of the results (*syndrome addisonien*). No post-mortem verification of the adrenal hypothesis has occurred, so far, in these subacute and chronic cases.

The authors express the opinion that derangement of the supra-renal bodies explains a group of concurrent symptoms—diminished arterial tension, asthenia, gastro-intestinal troubles, and lumbo-abdominal pains—that are almost classical in malaria; and they suggest that in the treatment of all grave cases of malaria adrenalin should be as familiar as quinine.

A. A.

Paisseau (G.) & Lemaire (H.). **Syndromes hémorragiques dans le paludisme primaire.**—*Bull. et Mém. Soc. Méd. des Hôpit. de Paris.* 1916. Oct. 26. 3 ser. Vol. 32. No. 27–28. pp. 1672–1685.

In the course of their study of malarial anaemia the authors have observed *inter alia* early haemorrhagic complications occurring between the first week and the second month after primary infection. They have met with cases of simple purpura, manifested in fine petechiae all over the body but particularly abundant on the legs, and characterised by a complete absence of pyrexia; of simple purpura shown in extensive ecchymoses and associated with ordinary "pernicious" symptoms; of haemorrhagic or haemophilic purpura, where the cutaneous ecchymoses are quite overshadowed by haemorrhages from the mucosae and particularly epistaxis, and the peripheral blood contains many immature elements and basophil multi-nuclears; of haemoglobinuric purpura, in which, besides petechiae and ecchymoses and epistaxis and bleeding from the gums, haemoglobinuria was a conspicuous symptom only four days after the initial paroxysm of a primary infection; and of pernicious subicteric anaemia, where within 23 days of the initial (and probably primary) infection, extremely severe epistaxis, concurrent with ecchymoses and petechiae, were prominent symptoms of a progressive anaemia that ended fatally within a month. The authors give clinical extracts of typical instances of all these forms of what they designate primary malarial haemorrhagic syndromata, along with statements of blood-counts in specific detail. In all cases the genetic malarial connection was confirmed by examination of the blood.

A. A.

Monier-Vinard, Paisseau & Lemaire (H.). **Cytologie du liquide céphalo-rachidien au cours de l'accès palustre.**—*Bull. et Mém. Soc. Méd. des Hôpit. de Paris.* 1916. Oct. 26. 3 ser. Vol. 32. No. 27–28. pp. 1607–1610.

The authors discovered in 23 out of 33 cases of malarial fever taken at random a characteristic cytosis (and also an increase of albumin) in

the cerebrospinal fluid withdrawn by lumbar puncture and centrifugated. Eighteen were cases of simple malarial paroxysm ; in three of these the fluid contained abundant lymphocytes, some small uninuclears, and some endothelial cells ; in six it contained a few lymphocytes and uninuclears ; in nine a few lymphocytes and sometimes occasional endothelial cells.

Five were cases of pernicious malaria, marked by coma passing into an algid state, paroxysmal convulsions, and other grave meningeal symptoms ; in two of these cases that terminated fatally the fluid contained floccules of fibrin and the centrifugated clot was composed of lymphocytes and a few multinuclears : in three cases that recovered there was a varying amount of lymphocytosis in two, and only abundance of endothelial cells in the third.

The authors conclude that there is a localized meningitis in malaria, with after-possibilities of damage to the nervous system.

A. A.

Weydemann (H.). **Drei Malariafälle im Heimatslazarett.** [Three Cases of Malaria in a German Hospital.]—*Zeitschr. f. Aerztl. Fortbildung.* 1916. Nov. 15. Vol. 13. No. 22. pp. 608–609. With 1 chart.

A critical account of three typical cases of malaria—one tertian, two double tertian—occurring in men convalescent from wounds in the hospital at Frohnau. The wounded men had been admitted in September, October and November, and the respective attacks of malaria followed in April, May and June. All three had the same antecedents ; they had never lived in a malarious country and had never before suffered from malaria ; before admission they had been on active service in Russia, where they had not heard that any of their comrades had fever or even that any were being treated with quinine. As neither Anopheles nor malaria are known in the country round about Frohnau, or have been heard of there for the last twenty years, they could not have acquired malaria after their admission. If, as seems the residual explanation, malaria is endemic in the part of Russia where they served and they were infected there, then the long latent period is remarkable.

A. A.

Job (E.) & Hirtzmann (L.). **Un mode d'administration de la quinine dans le paludisme.**—*Arch. Méd. et Pharm. Milit.* 1916. Oct. Vol. 66. No. 4. pp. 461–465.

From an experience of 2½ years in Morocco the authors advocate the use of quinine in repeated small doses. So given it is, in their experience, not only better absorbed, and so more effective in its action upon the malaria parasites, but also is unlikely to produce symptoms of cinchonism. The only drawback is that it is more exacting for the physician. The dose recommended is 0·25 gm. of the hydrochlorate. In an ordinary case six such doses (totalling 1·50 gm.) are given daily on six days of the first week and on five days of the second week, and four such doses (totalling 1 gm.) on four days of the third week and on three days of the fourth week.

A. A.

von Stejskal (Karl Ritter). **Ueber intravenöse Chininjektion bei Malaria.**—*Wien. Klin. Woch.* 1916. Sept. 14. Vol. 29. No. 37. p. 1174.

As the result of his experience of 50 cases the author considers that the best moment for the injection is when the temperature is beginning to rise, and that the best preparation is the bihydrochloride as it does not cause necrosis. The author has never observed quinine-resistance in malaria parasites, if by that term it be meant that the severity and the frequency of the attacks are not at all influenced by quinine.

A. A.

Telang (R. H.). **Quinoidine.** [Correspondence].—*Indian Med. Gaz.* 1916. Dec. Vol. 51. No. 12. pp. 474–475.

The writer has been using quinoidine for the last three years, making it up into pills (containing $2\frac{1}{4}$ grains) with an equal weight of a mixture of equal parts of starch and Mag. Carb., and administering from four to eight such pills daily. He finds that quinoidine in some cases is better than quinine, that it does not cause cinchonism, and that it has a slightly laxative effect.

A. A.

Lackmann (Theodor) & Wiese (Otto). **Ueber Optochin bei Malaria tertiana.**—*München. Med. Woch.* 1916. Oct. 10. Vol. 63. No. 41. pp. 1463–1464. With 6 charts.

Optochin is stated by the authors to be hydrochloride of ethyl-hydrocuprein, cuprein apparently being here a synthetic equivalent of the alkaloid of Cuprea bark.

It was administered in some cases of tertian malaria in the following manner:—0·2 gm. every two hours from 8 a.m. to 4 p.m. (or from 10 a.m. to 6 p.m.) daily for seven days; then a cessation for five days; then a course of optochin as before for two days; then another cessation for five days; and so on for several weeks.

Six charts showing temperature-curve and effect on malaria parasites are given to illustrate the results of six cases so treated. They show that (except in one case, where the effect was not quite so immediate) the temperature dropped from points varying from $1\frac{1}{4}°$ to about 4° above normal to a point about 1° below normal the day following the first exhibition of optochin, and (except in one case) remained steadily at the below normal point for the rest of the time (six to nine days) included in the charts, and that the parasites disappeared from the blood on the second or third day following the first exhibition of optochin.

The authors make bare mention of 14 other cases in which the results were equally good.

No ill effects of any kind were observed in any case, except one in which for a few hours there was slight buzzing in the ears.

A. A.

Stein (Benno). **Malariaparasiten und Neosalvarsan.**—*Wien. Klin. Woch.* 1916. Aug. 24. Vol. 29. No. 34. pp. 1071–1072.

Observations on the effect of salvarsan on malaria parasites in a single case of [? benign] tertian. The patient had been treated with quinine to begin with, and after an intravenous injection of 0·6 gm. of neosalvarsan five examinations of the blood were made at short intervals during the following eight hours. These observations, which are reported in meticulous detail, showed that in many of the parasites, but particularly in the young ring-forms, the protoplasm became disorganised, indistinct, and indifferent to stains.

A. A.

Rogers (Leonard). **Disappearance of Malignant Tertian Crescents from the Blood following the Intravenous Injection of Tartar Emetic.**—*Brit. Med. Jl.* 1917. Jan. 6. pp. 6–8.

A short account of two cases of subtertian malaria with crescents very numerous, in which the writer tried the experiment of injecting tartar emetic intravenously. In one case from the 9th to the 14th day (when the patient left Calcutta) after a single injection of 8 cgm. no crescents could be found. In the other case on the 5th to the 8th days after a *second* injection of a similar quantity no crescents could be found.

From some clinical observations by the author and Captain Hume, independently, on the influence of tartar emetic in benign tertian, the author is inclined to think that this drug is less effective than quinine against the intracorpuscular stages of the parasite, and is disposed to suggest that quinine should be used to check malarial paroxysms and afterwards tartar emetic (intravenously) to destroy the extracorpuscular stages and so both to prevent relapses and to render the patient less infective to mosquitoes.

With his usual moderation the author deprecates an exaggerated estimate of the results of two cases, but justifies the publication of the results as a rational invitation to other investigators.

A. A.

Ross (Ronald). **Tartar Emetic and Malaria.** [Correspondence].—*Brit. Med. Jl.* 1917. Jan. 27. p. 136.

The writer finds corroboration of Rogers's opinion that tartar emetic does not affect non-sexual forms of malarial parasites in a case, reported by Jackson, where a kala azar patient after prolonged intravenous treatment with that drug developed a mild form of tertian and had to be treated independently with quinine.

He recommends that a special malaria ward be instituted somewhere for the purpose of prolonged investigation, by exact enumerations, of the action of antimony, and incidentally of cinchona alkaloids other than quinine, and also of quinine itself in intramuscular injections.

A. A.

Johns (Foster M.). **The Centrifuge Concentration of Malaria Plasmodia for Diagnostic Purposes.**—*New Orleans Med. & Surg. Jl.* 1916. June. Vol. 68. No. 12. pp. 765–767.

The method is recommended for obscure and chronic cases in which

parasites cannot be found by ordinary methods. Briefly the procedure is as follows :—

Draw 10 cc. of blood.

Add 0·2 cc. of a 50 per cent. dextrose solution to prevent changes in parasites.

Defibrinate, or add 0·2 cc. of a 50 per cent. solution of sodium citrate to prevent coagulation. [If sodium citrate be used, the blood platelets might confuse one who is not an expert.]

Centrifuge until the cells are completely separated from the plasma, with the leucocytes in the surface layers. The parasites rise with the leucocytes.

Skim off the leucocyte layers, and centrifuge them in a smaller tube as before.

Draw off this leucocyte layer for films.

It is claimed that in the best preparations the parasites are concentrated about 900 times, and that as many parasites should be seen in one minute as in fifteen hours examination of ordinary films of the same blood. Very small parasites are not concentrated to the same extent however.

A. A.

Zweig (Walter). **Das Verhalten der mononukleären Leukozyten bei der Malaria.** [The Uninuclear Leucocytes in Malaria.]—*Wien. Klin. Woch.* 1916. Oct. 19. Vol. 29. No. 42. pp. 1328–1329. With 3 figs.

The authors describe various changes seen in the uninuclear leucocytes in malarial blood –changes that occur independent of quinine therapy.

The uninuclears become very numerous ; they may become enlarged, or distorted, or they may throw out long filaments of cytoplasm, or buds ; they become vacuolated, or may contain pigment granules, and the nucleus may be displaced or may divide curiously. The authors are of opinion that these changes are something novel, and that they throw a light on the deep-seated alterations in blood-formation that may occur in malaria patients.

There are a dozen text-figures, some of them rather weird ; one of them, exhibiting a displaced nucleus and a well-defined "nuclear-remnant" (*Kernreste*), looks like a poor representation of a phagocyte which has ingested a full-grown schizont that is on the point of dividing.

A. A.

Muehlens (P.). **Ueber Malariagefahren und ihre Verhütung durch Chininprophylaxe und Chininbehandlung.** [On Malaria-Carriers and their Preclusion by Quinine Prophylaxis and Quinine Treatment.]—*München. Med. Woch.* 1916. Sept. 26. Vol. 63. No. 39. pp. 1398–1399.

According to the author most parts of Germany—the north-western parts of the country, the mouths of the Oder and Weichsel, and the neighbourhood of Leipzig are exceptions –are free from endemic and epidemic malaria, though Anopheles mosquitoes are plentiful. The German troops however are now much in contact with malaria, not only in the Balkans and in Turkey, but also on the west and east fronts ;

and the purpose of this paper is to draw attention to the danger of re-infection of Germany by soldiers going on leave, and still more by soldiers returning home after the war. The author uses iteration of the kind forcibly stigmatised by Falstaff in peremptorily enjoining regular quinine prophylaxis and the vigorous after-treatment of all cases of malaria, which must not be permitted to leave the medical officers' hands until they are assuredly free of parasites.

A. A.

Harford (C. F.). **Quinine as a Prophylactic.**—*Trans. Soc. Trop. Med. & Hyg.* 1916. Dec. Vol. 10. No. 2. pp. 43–44.

A temperate and judicious criticism of one of the main theses of Dr. A. MacDonald's paper in the *Transactions of the Society of Tropical Medicine and Hygiene* for November, 1916 [see this *Bulletin*, Vol. 9, p. 77]. It is pointed out that in the prevention of malaria quinine is recognised as a most useful auxiliary by some of the most strenuous supporters of the sanitary policy of eliminating mosquitoes both by direct effort and by education of the proletariate; and that the attribution of ill effects to prophylactic doses of quinine is not generally justified. Particularly is the allusion to blackwater fever deprecated, the author being of opinion that in West Africa the restriction of this malady is largely due to quinine prophylaxis. The author concludes with an emphatic approval of a daily dose of 5 grains of quinine for Europeans in tropical Africa, while at the same time firmly endorsing Dr. MacDonald's advocacy of the establishment in every colony of a sanitary staff concerned with preventive measures of a wider and more enduring kind.

A. A.

Brignone (Emiliano). **La malaria in Terranova Monferrato durante il quadriennio 1912-1915 con speciale menzione alla propaganda e profilassi antimalarica scolastica dell' anno 1915.** [The Anti-malarial Campaign in Terranova Monferrato for the Four Years 1912–1915.]—*Malariologia.* 1916. Dec. 31. Ser. 2. Year 2. No. 6. pp. 145–163.

An account of the progress of the anti-malarial campaign in the above district, which is situated on the left bank of the river Po, in Italy. The following table shows the amount of quinine distributed and the number of cases of malaria, for the 12 years 1904–1915 inclusive:—

	Grammes of Quinine.	Cases of Malaria.
1904	1,100	123
1905	3,470	109
1906	5,040	87
1907	5,664	68
1908	9,548	53
1909	10,360	34
1910	11,640	17
1911	12,476	9
1912	13,654	14
1913	12,278	11
1914	12,524	9
1915	13,132	7

The author considers himself justified by these figures in suspending for the future wholesale quinine-prophylaxis of families, confining himself instead to the treatment of school children. For this purpose 2,524 grammes of quinine were distributed in chocolate tablets amongst 285 school children in the year 1915. It will be seen by the figures that the district was but a small one.

J. B. Nias.

Orta (Francesco). **Lo stato attuale della malaria in provincia di Ferrara.** [The Present Condition of Malaria in the Province of Ferrara.]—*Malariologia.* 1916. Dec. 31. Ser. 2. Year 2. No. 6. pp. 164–171. With 4 figs.

A short paper pointing out that a badly managed system of drainage works in a malarial district often leaves many stagnant collections of water, in which mosquitoes can breed at their pleasure. In summer time, in order to economize coal, the pumping of water from the drains into the main canal of such systems is often stopped because it is considered unnecessary, or perhaps undesirable, to drain the adjacent subsoil quite dry. The residues of stagnant water in these half-dry canals are then, of course, as available for the breeding of mosquitoes as any natural pond. In this way may be explained the failure of many well planned drainage systems to produce any substantial diminution in the amount of malaria in a district. The paper is accompanied by four well-chosen photographs illustrating such conditions.

J. B. N.

di Pace (Ignazio). **A proposito della Malaria da sterri. Problemi di malariologia.** [Malaria and Reclamation Works. A Problem in Malariology].—*Malariologia.* 1916. Feb. 29, April 30, June 3, Aug. 31, Oct. 31. Dec. 31.; Ser. 1. Year 9; Nos. 1, 2, 3, 4, 5, 6; pp. 23–37; 57–63; 80–91; 103–115; 134–141; 171–180.

The author of this paper develops, in a rather prolix and uninteresting manner, a theory still much in vogue with a certain school of Italian epidemiologists, namely, that there is a third and hitherto unidentified element in the spread of malaria in addition to man and the mosquito. The author bases his argument chiefly on what happened in certain small areas of reclamation-work in Italy with which he was personally familiar, and does not look much beyond this narrow circle of facts. Those who are interested in the argument of a *tertium quid* in the spread of malaria would do well to look at the original paper.

J. B. N.

Gonzáles Rincones (R.). **Presentación de dos anofelinos capturados en Aragua por el doctor Núñez Tovar.** [Note on Two Anophelines taken in Aragua (Venezuela) by Dr. Núñez Tovar.]—*Gaceta Med. de Caracas.* 1916. Nov. 30. Vol. 23. No. 22. pp. 171–172.

The author records the identification of two new Venezuelan species of mosquito, both capable of transmitting malaria. The first is a new sub-species of *Cellia*, distinguishable from *argyrotarsis* and *albimana* by

having the posterior tarsi ringed with pure white. Only one specimen, a female, was taken. The second is *Anopheles crucians* Wiedemann, not hitherto recorded from Venezuela. This brings up the number of known species of malaria-transmitting mosquitoes in Venezuela to four, the other two being *C. argyrotarsis* and *C. albimana.*

J. B. N.

Jnanendra Nath Dutt. **Adulteration of Quinine.** [Correspondence]. —*Indian Med. Gaz.* 1916. Dec. Vol. 51. No. 12. p. 474.

The writer states that in some up-country bazárs quinine adulterated with some white substance that effervesces when treated with an acid is being sold under a counterfeit label, and he suggests that this sort of thing may have something to do with the vulgar loss of faith in quinine.

A. A.

BERIBERI AND POLYNEURITIS AVIUM.

VEDDER (Edward B.). **The Known and the Unknown with regard to the Etiology and Prevention of Beri-beri.**—*Milit. Surgeon.* 1916. Oct. Vol. 39. No. 4. pp. 368–379.

The author read a paper on this subject before the second Pan-American Scientific Congress which, though of great interest, contains no new facts. He states that it is of the utmost scientific interest to solve the following problems.

(1) The relationship between wet and dry beriberi; are these two types of the disease caused by a deficiency of the same vitamines?

(2) What is the physiological action of the vitamines; are they indispensable building stones for certain tissues (necessary for the building up of nervous tissues, as believed by the author) or are they concerned in some other manner as in carbohydrate metabolism?

(3) What is the chemistry of the vitamines?

The elucidation of the first point is now more possible, for ROMMEL and VEDDER have found that pigs suffer from wet beriberi, as distinct from the dry form found in birds [see this *Bulletin*, Vol. 7, p. 374].

P. W. Bassett-Smith.

VEDDER (Edward B.). **The Relation of Diet to Beriberi and the Present Status of our Knowledge of the Vitamins.** *Jl. Amer. Med. Assoc.* 1916. Nov. 18. Vol. 67. No. 21. pp. 1494–1497.

In this most interesting paper the author gives a concise account of how the deficiency theory of beriberi was evolved from careful experimental observations mostly made on birds, but later on man himself, and how certain substances which were separated from foods became recognised and were called vitamines by FUNK. These were found by many other workers also to be necessary factors for the prevention and cure of the disease and finally there was strong evidence to show that there were various forms of vitamines, each practically specific, for beriberi and other conditions, such as scurvy and probably pellagra. A great step forward was made when WILLIAMS [unpublished work] was able to produce these bodies synthetically, closely allied to and isomeric with the hydroxypyridins and found in yeast as adenin. The exact rôle that these vitamines play in metabolism has not yet been clearly made out but, as the author has stated previously, he thinks that the anti-neuritic vitamine acts as a building stone of the complex structure of the nervous tissue. When there is a deficiency of this vitamine the nervous tissue becomes first exhausted, and then degenerated, producing in birds polyneuritis and in man dry beriberi. He does not believe in the theory put forth by BRADDON and COOPER that the vitamine is concerned in the carbohydrate metabolism or that with a deficiency of vitamine the larger supply of carbohydrates ingested the more quickly will the neuritis appear. On this question he proposes shortly to publish further experimental evidence. He again emphasises the fact that beriberi in man is not only dependent on rice, but is produced by deficiency when various

other foods are the staple diet: white flour, canned foods, etc. Attention is drawn to the work of JURGENS on a disease found in prison camps in Europe, called "the oedema disease," which is probably wet beriberi.

That pellagra is a deficiency disease he is firmly convinced and his reasons for coming to this conclusion are given. Finally the author lays down a number of simple dietary rules for the prevention of deficiency disease, which are sufficiently important to be quoted in extenso.

"1. In any institution where bread is the staple article of diet, it should be made from whole wheat flour.

"2. When rice is used in any quantity, the brown undermilled, or so called hygienic rice, should be furnished.

"3. Beans, peas or other legumes, known to prevent beriberi, should be served at least once a week. Canned beans or peas should not be used.

"4. Some fresh vegetable or fruit should be issued at least once a week and preferably at least twice a week.

"5. Barley, a known preventive of beriberi, should be used in all soups.

"6. If cornmeal is the staple of diet, it should be yellow meal or water-ground meal, that is, made from the whole grain.

"7. White potatoes and fresh meat, known preventives of beriberi and scurvy, should be served at least once a week, and preferably once daily.

"8. The too exclusive use of canned goods must be carefully avoided."

P. W. B-S.

HEISER (Victor G.). **Memorandum with Respect of Beriberi in the Orient.**—4 pp. 1915. Sept. 30. New York. [The Rockefeller Foundation].

This note contains nothing new, but the author does useful work in drawing attention to the little good that is being done by leaving the preventive measures against beriberi to the education of the people eating rice, and manufacturers preparing the grain; the only effective method being concerted international action and the placing of a small tax on over-milled rice if the disease is to be abolished from rice-eating countries.

P. W. B-S.

DIETERLEN. **Ueber ëine im Jahre 1914 in der Südsee beobachtete Beriberi-Epidemie.** [An Epidemic in the South Sea seen in 1914.] —*Arch. f. Schiffs- u. Trop.-Hyg.* 1916. July. Vol. 20. No. 13. pp. 306–311.

The epidemic occurred among the Melanesian natives in New Mecklenburg, an island of the Bismarck Archipelago. These were almost exclusively fed on polished rice but on account of the war the last rice was issued about the middle of August and after this the men lived on sago and cocoa nuts. The first case was observed in August. The disease was mostly of the atrophic-paralytic type, and there were only two deaths. Condensed milk, cocoa, fresh fish, fruit, taro, and sweet potatoes were provided as extra food and the epidemic died out in November. During the first half of October there were as many as five fresh cases daily.

P. W. B-S.

FINDLAY (G. Marshall). **Beriberi.**—*Practitioner.* 1917. Jan. Vol. 98. No. 1. pp. 69–78.

This article is founded on 36 cases of beriberi which have occurred in H.M. ships employed in the Persian Gulf, Indian Ocean, Red Sea, and Suez Canal zones. The patients were Europeans, Indians, and Chinese. A good description of so called ship-beriberi is given with details of some of the cases. In the majority the cause could not be put down to the consumption of rice, but a deficiency in vitamines was generally easily demonstrated by an analysis of the diet taken. Predisposing causes dependant on temperature and humidity also play an important part. Clinically oedema of the legs is almost always present, and in half the cases it was found over the sternum, cheek bones, and forearms. In some instances attacks of syncope were noticed and anaemia is common, the red cells falling to 3,500,000 per cmm., while the leucocyte count is increased. For treatment the use of yeast in some form is strongly advocated.

P. W. B-S.

FINDLAY (G. Marshall). **Note on a Case of Beriberi.**—*Lancet.* 1916. Oct. 7. pp. 646–647.

The history given is that of a Naval rating aged 23, who spent the greater part of the last five years in the Persian Gulf and India. After seven months of perfect health in September, 1911, he complained of weakness and swelling of the legs, which disappeared after three weeks' treatment. The following year he contracted malaria and in June, 1912 the symptoms returned plus cardiac signs and loss of deep reflexes. Most of 1913 was spent at Colombo and he had no relapse. In 1914 while at sea there was a slight return of symptoms but in September 1915 there was again a severe relapse with all the cardinal symptoms. The patient was well nourished but anemic. There were no cases of beriberi among his ship mates and the only possible causative factor noted was that this man during the seven months previous to his first attack never took fresh meat. This defect was afterwards remedied but without preventing recurrences of the attacks. There were in the five years four attacks with gradually increasing debility.

[VEDDER quotes a case of undoubted beriberi in a ship's officer, who had taken a most varied and satisfactory diet, except that for the previous four months everything he had eaten had been canned.]

P. W. B-S.

REED (Alfred C.). **Beriberi. Report of Cases.**—*Jl. Amer. Med. Assoc.* 1917. Jan. 13. Vol. 68. No. 2. pp. 116–118.

The author describes two cases of disease in which the diagnosis of beriberi was made, but in neither was the course typical and other pathological conditions were present. Case one, that of a Japanese, aged 44, for twelve years a resident in the United States. Cardiac palpitation and hypertrophy with pretibial oedema and symptoms of peripheral neuritis were present, but signs of renal insufficiency, alveolar pyorrhoea, and a Clonorchis infection were found. In case

two the patient was a Chinaman who had been in the United States for thirteen years. At the clinic, a diagnosis of peripheral neuritis was made, possibly beriberi (though the knee jerks were exaggerated). There was some slight irregularity of the cardiac rhythm and pretibial oedema. A Trichocephalus infection with pyorrhoea and latent tuberculosis was also present.

P. W. B-S.

Reinhard (Paul). **Röntgenbefunde bei beriberiartigen Erkrankungen.** [Röntgen Ray Appearances in Beriberic Affections.]—*Arch. f. Schiffs u. Trop.-Hyg.* 1916. Jan. Vol. 20. No. 1. pp. 1–11. With 3 plates and 13 text figs.

The author has examined orthodiagramatically by X-rays six patients in the standing position to show the alteration of the cardiac shadows found in beriberi. He arrived at the following conclusions. In beriberi the pulmonary vessels and the right side of the heart are first enlarged, and later the left side becomes affected. When convalescence begins, first the left side clears up, then the right side and finally the pulmonary vessels resume their normal characters. Sketches and radiograms are given to show his methods and results.

P. W. B-S.

Gibson (R. B.) & Concepción (Isabelo). **The Influence of Fresh and Autoclaved Cows' Milk on the Development of Neuritis in Animals.** —*Philippine Jl. Sci.* Sec. B. Trop. Med. 1916. May. Vol. 11 No. 3. pp. 119–131. With 2 plates and 2 figs.

The value of milk for supplying vitamines to growing organisms, and information as to whether these are easily destroyed by heat are points of very great interest not only in the Philippines where infantile beriberi is so common, but to all concerned in the development of children. It has long been believed that boiled milk is a predisposing cause of rickets and scurvy-like symptoms, and much experimental evidence has been brought forward to demonstrate the harmfulness of heating the milk and devitalising it. The vitamines themselves are known to be destroyed by heat, those for scurvy at a lower temperature than those for beriberi. The authors have attempted to determine what amount of antineuritic substances are present in milk and how these are affected by autoclaving the milk at 120° C. for two hours. Experiments were carried out with fowls, dogs and pigs.

Three fowls were fed on 40 grams of polished rice and 100 cc. of fresh cow's milk daily, and three with rice and a similar quantity of autoclaved milk. Both sets developed mild polyneuritis about the usual time but did not lose weight. Post-mortem, the sciatic nerves showed degenerative changes. In a second experiment 200 cc. of milk and 10 grams of rice were given daily and none of these fowls developed neuritis and no degenerative changes in the nerves were found. Five puppies, 12 days old, were then used, three being fed on autoclaved milk and two on fresh cow's milk. On the 89th day the dogs were undersized and partially aphonic; they were killed on the 92nd day. No scorbutic symptoms were shown by any of the animals,

but those fed on the autoclaved milk lost weight rather more than the other two. Post-mortem, no gross changes, endocrinal glands normal, degenerative changes in sciatic nerves of all.

Six 17 day old pigs were then experimented with. The gain in weight was practically identical in each. On the 34th day all appeared normal, and two were then killed. Post-mortem, early changes of degeneration were found in the sciatic nerve, more marked in the one fed on fresh milk than in the pig having autoclaved milk. On the 56th day all the remaining four had developed marked oedema, and on the 60th day two more were killed. Post-mortem showed no signs of scurvy, the endocrine glands were normal but the sciatic and pneumogastric nerves were degenerated. The two remaining pigs continued to gain weight but oedema and aphonia remained. One died suddenly on the 74th day and one on the 106th day. Nerve degenerations were present and, in both, a rupture of the anterior coronary artery had occurred.

These experiments show that " the anti-neuritic vitamine is present in milk in slight amount only, and that continued feeding on either fresh or autoclaved milk to animals without suitable addition to the diet, induces certain beriberi symptoms, degeneration of nerves, oedema, and aphonia." No signs of scurvy were found and no evidence was given that autoclaving milk for two hours at 120° C. had affected its nutritive value. From this they reason that as the antineuritic powers of milk are so slight, infants should be given mixed diets as soon as possible. Each child of a *healthy* mother has a reserve supply to draw on until such time as it is normally able to take other foodstuffs than milk. [This would also apply to patients restricted to milk diet for long periods. The vitamine content and nutritive value of milk for its own species is not accurately comparable to the feeding of an animal on milk derived from other species.]

P. W. B-S.

McCollum (E. V.) & Davis (Marguerite). **The Nature of the Dietary Deficiencies of Rice.**—*Jl. Biol. Chem.* 1915. Nov. Vol. 23. No. 1. pp. 181–230. With 42 charts.

In this very interesting paper the authors develop the theory that for the normal growth of animals there are two accessory substances that are required to be added to a rice diet, namely a water soluble substance which is thermostable and soluble in alcohol, and a fat soluble substance [see this *Bulletin*, Vol. 8, p. 465, for summary of a later paper]. A very large number of feeding experiments on rats were carried out to determine the quantities of these accessory substances in various food-stuffs and the amounts that were required of each, the experiments in some cases extending over more than one generation of the animals and being therefore very thorough. They proved that the want of salts was not the cause of the failure in growth and also that rice, up to 80-90 per cent. of the food mixture, in itself did not contain any property that was harmful to the animals. Lactose, especially commercial kinds of unknown purity, when added to rations of polished rice supplemented with purified foodstuffs (casein, butter fat, salts and dextrin) was found to cause considerable improvement in the growth of rats over those on similar diet without

the lactose. The most efficient substances containing both the water soluble and fat soluble substance are wheat embryo and other cereal embryos. Desiccated egg-yolk also contains both fat and water soluble accessories but a ration with 5 per cent. of egg-yolk is not sufficient alone to induce growth, too little of the water soluble substances being contained in it. If 10 grms. per cent. of ration of lactose is added to supplement this deficiency, good growth takes place. Skim milk powder is rich in the water soluble accessory. It was found that a ration with as low a percentage of protein as 10 was able to support vigorous growth when supplemented equally by one of the growth promoting fats (wheat embryo and butter fat) and an inorganic salt mixture.

Polished rice and salts together with sufficient wheat embryo to supply liberal protein and water soluble accessory does not support growth, for it does not contain a sufficiency of the fat soluble accessory. This must be added before growth can proceed; likewise 20 per cent. of butter fat alone added to the ration without addition of the water soluble factor will fail to promote growth.

Numerous charts are given to show the curves of growth in the different experiments.

P. W. B-S.

Stepp (W.). **Ist die durch Lipoidhunger bedingte Ernährungskrankheit identisch mit Beriberi?** [Is the Food Disease caused by Lipoid Starvation Identical with Beriberi?]—*Zeitschr. f. Biol.* 1915. Vol. 66. New Ser. Vol. 48. pp. 339–349.

The author carried out a large number of carefully planned feeding experiments to determine the value of accessory substances, such as vitamines and lipoids, in a diet and whether one could replace the other. Mice were the animals used. The experiments are divided into three groups. (1) Lipoid-free food plus vitamines. (2) Vitamine-free food plus lipoid. (3) Controls. It must be understood that lipoid-free does not signify that the food has also been deprived of all its vitamine, for dog biscuit after being repeatedly extracted with 90 per cent. alcohol is only partially freed from its vitamine, but almost all of its lipoids have been extracted.

The substances used were polished rice (vitamine-free); a rice extract containing a high percentage of vitamine, prepared at Basil and called Orypan; dog biscuit, which normally is a perfect food for mice; dog biscuit extracted with alcohol (lipoid-free); alcoholic extract of egg-yolk (lipoid); and salt mixtures.

(1) Animals on lipoid-free food plus vitamine; all the animals died. Controls were made using:—

(*a*) Dog biscuit extracted with alcohol plus salt mixture (no lipoid); all died.

(*b*) Dog biscuit extracted with alcohol, salt mixture, and alcoholic extract of egg-yolk (lipoid); all lived; here both vitamine and lipoid were present.

(2) Animals on vitamine-free food plus lipoid; all the animals died after three or four weeks. The controls were:—

(*a*) Animals fed on polished rice only; death in $3\frac{1}{2}$ weeks.

(*b*) Polished rice, salt mixture, and orypan (vitamine plus lipoid); all but one of the animals recovered.

The experiments clearly indicate that a highly efficient food, as unhusked rice, through the removal of vitamine by polishing will become inefficient, and only by an addition of vitamine can it be made again sufficient, not by the addition of any other accessory substance as lipoid. This lipoid-free food, which contains a small quantity of vitamine also, can only be rendered efficient by the addition of lipoids. Both vitamine and lipoid are required for normal metabolism and neither can replace the other.

P. W. B-S.

Funk (Casimir). **The Influence of Radium Emanation on the Activity of Vitamine.**—*Proc. Soc. Experim. Biol. & Med.* 1916. Vol. 14. No. 1. pp. 9–10.

Experiments were carried out to see if by means of Radium emanation differentiation between the vitamines which cure beriberi and those that influence growth in young rats could be made, and whether such unstable substances as vitamines would become inactivated by the emanation. Autolized yeast was used for the experiments, administered by intramuscular injections into pigeons which had developed polyneuritis by feeding on white rice. The action of the yeast which had been exposed to the emanations did not differ from that which had not been so treated, and incidentally it was proved that the radium had no destroying action on the vitamines, neither did the emanation have any detrimental action on the vitamines which stimulate growth. A further set of experiments using the spindle cell sarcoma of chickens also gave negative results as far as the emanation was concerned.

P. W. B-S.

Lhermitte (J.). **Les lésions cérébrales de la polynévrite avitaminique (Béribéri expérimental).**—*Rev. Neurologique.* 1916. July. Vol. 23. No. 7. pp. 6–8.

The author states that very little has been done in the study of the changes in the central nervous system in deficiency diseases. He therefore in 1914 commenced work with the object of demonstrating the presence of changes if any; the investigation has been interrupted, but what was done is of interest. Severe polyneuritis was induced in a fowl by rice feeding and when paralysis was well marked the bird was killed and the nervous system carefully examined. The sciatic nerves as usual showed marked evidence of degeneration of their constituent fibres without evidence of vascular inflammatory changes. There were degenerative changes in the cells of the anterior horn of the cord not affecting the nuclei and nucleoli. The grey matter of the brain showed very marked lesions of the cells and neuroglia, similar to those that are found in classical psychopolyneuritis characterised by alterations of the colour and form of the nerve cells, their progressive disintegration being associated with a reactionary proliferation of the neuroglia.

These cortical lesions are associated with "alimentary avitaminic polyneuritis," experimental beriberi, and toxic polyneuritis.

P. W. B-S.

CHOLERA.

Sanarelli (G.). i. **Pathogénie du cholera. Reproduction experimentale de la maladie.**—*C. R. Acad. Sci.* 1916. Nov. 6. Vol. 165. No. 19. pp. 538–540. ii. **La patogenesi del colera.**—*Ann. d'Igiene.* 1916. Nov. 30. Vol. 26. No. 11. pp. 685–691.

A series of observations on the production of cholera in the rabbit. It is owing to a lack of immunity that a recently born rabbit succumbs to cholera whether inoculated subcutaneously or intravenously or fed in large doses. In the author's opinion the vibrios when given per os do not reach the small intestine through the stomach, in which *V. cholerae* can never be found, but after absorbtion by the mucous membrane of the mouth and the tonsils by means of the blood or lymph channels. The vibrios first appear in the neighbourhood of the ileo-caecal valve—in the ileum, caecum and appendix. In some cases they spread along the small intestine, even occasionally reaching the duodenum but this usually remains sterile like the stomach. Recently born rabbits, if of mothers inoculated against cholera, cannot be infected with cholera any more than adult ones can. They have acquired a premature immunity.

Immunity the result of age can, however, be broken down and a typical cholera attack can be made possible, if the rabbit is given an inoculation of living Coli into the walls of the appendix or the sacculus rotundus a few hours before inoculation or feeding with *V. cholerae*, or even if 1–2 cc. of a filtered 48 hours broth culture of *B. coli* is given intravenously. The Coli toxins act on the intestinal walls and predispose them to the cholera attack that ensues. Rabbits previously inoculated against either *V. cholerae* or *B. coli* do not respond to this method of producing typical cholera.

The author obtained similar results with two vibrios, one recently isolated on the Isonzo front and one isolated as long ago as 1911; the latter was the more toxic and while more profound symptoms accompanied death, far fewer vibrios were to be found in the intestinal canal. This recalls cases occurring in human beings, where with severe symptoms vibrios are found in the faeces with difficulty if at all.

H. Schütze.

Nichols (Henry J.). **Experimental Observations on the Pathogenesis of Gall-Bladder Infections in Typhoid, Cholera, and Dysentery.**—*Jl. Experim. Med.* 1916. Nov. 1. Vol. 24. No. 5. pp. 497–514.

The author suggests that gall bladder infections following on cholera attacks "are due to a portal or general septicaemia with elimination of organisms in the bile" (a process of this kind having been demonstrated by him experimentally in the case of typhoid) and thinks that the apparently smaller number of chronic carriers in cholera may be due in part to the small percentage of cases in which invasion of the blood occurs.

That gall bladder lesions are not to be found in rabbits after intravenous inoculation [here the author ignores the results of Greig, this *Bulletin*, Vol. 8, p. 167] the author considers to be due to the fact that most samples of rabbit bile are antiseptic to *V. cholerae*.

H. S.

Neri (Filippo). **Ricerche sperimentali sulla vaccinazione antitifica e anticolerica.** [Experimental Research on Typhoid and Cholera Vaccines].—*Sperimentale.* 1916. Nov. 14. Vol. 70. No. 5. pp. 469–518.

A comparison of the agglutinin and bacteriolysin producing properties of a number of cholera vaccines and of the two methods of inoculation—subcutaneous and intravenous.

The following cholera vaccines were chosen:—The vibrios are suspended in (*a*) $\frac{n}{10}$ caustic soda, (*b*) 2 per cent. formalin, (*c*) physiological saline, 0·5 per cent. phenol being added with or without previous heating of the vaccine to 53° for one hour, (*d*) $\frac{n}{10}$ sodium carbonate + 0·5 per cent. phenol (in this the vibrios are quickly sterilised—five hours for a 1,000 million per cc. emulsion—and dissolve to give a faintly opalescent solution). The $\frac{n}{10}$ caustic soda vaccine was found to become inactive and incapable of producing antibodies in a few days. The sodium carbonate vaccine (*d*) appeared somewhat superior to both the heated and the formalised.

No appreciable difference was to be seen in the antigenic power of the two unheated phenolised vaccines, the one being a suspension in physiological saline and the other in $\frac{n}{10}$ sodium carbonate and it is difficult to see why the author suggests the use of the latter; the only superiority he implies is that sterility is somewhat more quickly attained, the difference however being a matter of hours.

As regards the two methods of inoculating, the author confirms the findings of previous workers—there is nothing to choose between them for the production of bacteriolysin, but for agglutinin the intravenous method gives consistently better results.

[Although the experiments recorded tend to point as indicated above, the differences observed are so undecisive considering the numbers of animals employed (between two and four for each type of vaccine) that definite conclusions cannot with justification be drawn.]

H. S.

Levi della Vida (Mario). **Presenza di agglutinine non specifiche in alcuni sieri agglutinanti il vibrione del colera.** [Non-Specific Agglutinins in Cholera Sera.]—*Ann. d'Igiene.* 1916. Dec. 31. Vol. 26. No. 12. pp. 746–756.

The opinion is expressed that many workers are too inclined to believe that inagglutinable vibrios are modified Koch strains and it is pointed out as a significant fact, that while it is not rare to isolate inagglutinable vibrios from water, it is exceptional to do so from faeces.

Three partially inagglutinable strains isolated from non-cholera cases are described in this paper. The author considered their agglutinability might be due to the previous cholera inoculation of the men, in the same way as inagglutinable typhoid strains are obtained by growing *B. typhosus* in typhoid agglutinating serum. The three

strains were morphologically and culturally similar to the Koch vibrio, but serologically there were differences. Pfeiffer was negative with all three and the agglutinations that resulted with four different sera are shown in the table opposite.

The author decided that this meant :—

(1) That the strains were true cholera vibrios which had lost their agglutinability partially for some sera, wholly for others, or

(2) That they were not true cholera vibrios and the agglutination was a group phenomenon, or

(3) That the agglutination was non-specific and due to normal agglutinins in some of the sera.

It was found that agglutinability was not restored by a preliminary heating of the vibrio emulsions to 100° C. for an hour as suggested by Dreyer and Jex-Blake and by Porges.

Absorbtion experiments with cholera serum went to prove that the agglutinins for the Cremona and R 82 strains in the $\frac{1}{10000}$ serum were group agglutinins, while the agglutinins from R 154 in the $\frac{1}{5000}$ serum were more distinct and could not be removed by absorbing that serum with *V. cholerae.*

Autogenous sera prepared from the several inagglutinable strains were seen to be incapable of agglutinating *V. cholerae* or indeed either of the two other and heterologous inagglutinable vibrios.

The author considered that the Pfeiffer test and these serological results went to prove that the three vibrios were not true cholera organisms.

A number of normal sera were tested for the presence of agglutinins and it was found that horse, mule and ass sera sometimes contained agglutinins up to a titre of $\frac{1}{150}$ and $\frac{1}{250}$ for *V. cholerae* as well as the three inagglutinable vibrios, but that human, rabbit and goat sera were always free of them.

H. S.

Puntoni (Vittorio). **Ancora sui vibrioni "inagglutinabili."** [Inagglutinable Vibrios.]—*Ann. d'Igiene.* 1916. Dec. 31. Vol. 26, No. 12. pp. 741–746.

Two vibrio strains were isolated from an Italian soldier who contracted what was apparently typical cholera. While both strains were culturally *V. cholerae*, only one agglutinated with cholera serum, the other being quite inagglutinable.

After some months the agglutinable strain was found to have lost its agglutinability. Serological tests were now carried out with the two strains and sera prepared from them. These did not agglutinate the Koch vibrio. In the same way absorbtion of agglutinin and complement fixation tests were negative when true cholera sera were used with the inagglutinable strains and, vice versa, when typical cholera organisms were tested against the sera prepared from the inagglutinable vibrios.

No bacteriolysis took place when the inagglutinable strains were injected intraperitoneally into guinea-pigs previously immunised with the true *V. cholerae.*

The author concludes that the Koch vibrio has here undergone a biological change, which in the case of the strain isolated in an

Serum Reactions of Three Partially Inagglutinable Strains of Vibrio.

Vibrios.	Serum : Titre = 1/10,000					Serum : Titre = 1/8,000					Serum : Titre = 1/3,000			Serum : Titre = 1/4,000		
	1/100	1/200	1/500	1/1,000	1/2,000	1/100	1/200	1/500	1/1,000	1/2,000	1/100	1/200	1/500	1/100	1/200	1/500
Cremona	+++	+++	+++	+	—	++	—	—	—	—	—	—	—	—	—	—
R 82 ..	+++	+++	±	—	—	—	—	—	—	—	—	—	—	—	—	—
R 154..	—	—	—	—	—	+++	+++	+++	+	—	—	—	—	—	—	—

inagglutinable condition took place in the man's intestinal canal, in the case of the other strain it occurred *in vitro.* [The possibility of a confusion of culture tubes having taken place and of the agglutinable strain having been lost is not considered by the writer.]

H. S.

Kutscher (Fr.) & Schaefer. **Die Verwendung von Typhus- und Choleraimpfstoffen als Antigene bei der Komplementbindungsreaktion.** [The Use of Typhoid and Cholera Vaccines as Antigens for Complement Fixation.] —*München. Med. Woch.* 1916. Oct. 31. Vol. 63. No. 44. pp. 1570–1571.

Three different cholera vaccines were tested as antigens for complement fixations, using a donkey agglutinating serum and a rabbit bactericidal serum as antibodies, and were found to fix well and to equal extent and to be durable in this respect. The authors find that for the complement fixation tests sheep cells can be kept as long as 14 days by storing in a cool place after adding 0·1 per cent. phenol to the saline suspension. Experiments with such corpuscles in the Wassermann test were not made, he mentions.

H. S.

Hall (H. C.). **Ist es möglich, einen sofort brauchbaren Dieudonnéagar herzustellen, ohne die Zusammensetzung des Substrates zu verändern?** [A Ready-to-Use Dieudonné Medium.]—*Berlin. Klin. Woch.* 1916. Feb. 28. Vol. 53. No. 9. pp. 217–219.

Judging the absorbtion of CO_2 from the air to be the main feature in the "maturing" that Dieudonné agar requires and in order to ascertain the time taken to "mature" by the Dieudonné blood-alkali mixture when stored in bottles, the author carried out the following experiment. The defibrinated blood-alkali mixture was filled into bottles some of which had cotton wool plugs, others air-tight rubber caps, and kept at 5° C.

After standing for three weeks plates were poured with agar in the usual way, stood with the lids off and under sheets of sterile paper at 37° C. for various lengths of time and then inoculated with cholera.

Hours the plates stood at 37°.	1	2	3	4	5	24
Mixture stored with cotton wool plugs.	No growth.	Growth.	Very plentiful growth.	Very plentiful growth.	Very plentiful growth.	Very plentiful growth.
Mixture stored with air-tight rubber caps.	No growth.	No growth.	No growth.	No growth.	One colony.	Plentiful growth.

When the period of maturation was prolonged to five weeks, the plates were ready within half to one hour after pouring, a very considerable improvement on the 48 hours needed when the mixture is fresh. Tested with a variety of organisms and artificially prepared

cholera stools, the medium had strong selective powers. The author has tested blood alkali mixtures up to nine months of age, and found no depreciation in its qualities within that period.

H. S.

Lange (Carl). **Ein neuer Nährboden für die Choleradiagnose.** [New Cholera Medium.]—*Zeitschr. f. Hyg. u. Infektionskr.* 1916. Vol. 81. pp. 138–153.

This diagnostic cholera medium has already, in 1915, been described by the author [this *Bulletin*, Vol. 6, p. 499]. The only additions to what has been already published are some " tips " as to the making of the medium and a recognition of criticism subsequently passed [this *Bulletin*, Vol. 7, p. 240]. To avoid the starch of the plates being attacked by the diastatic ferments which are present in stools, particularly diarrhoeal stools, it is necessary to dilute the faeces and not plate too thickly. The author admits that for this reason direct plating does not always give such good results with his medium as with some other media, for instance, Dieudonné, but declares that if a preliminary peptone water enrichment precedes the plating this alkaline starch medium is superior in that it gives a rapid growth, easily discernible colonies and very agglutinable material.

The paper also indicates the possibility of the use of casein and of milk as indicators (the proteolytic ferment produced by the cholera vibrio forming in these cases also a clear zone round the colonies) and of a combination of casein and starch, in which case only organisms producing both diastatic and proteolytic ferments would occasion complete transparency in the medium around these colonies. *B. subtilis* would seem to be the only organism to do this besides the vibrios.

H. S.

Fuerst (Th.). **Lentzsches Blutalkalitrockenpulver zur Bereitung von Choleranährböden in Feldlaboratorien.** [Lentz's Desiccated Blood-Alkali Medium for Choleradiagnosis.]—*Deut. Med. Woch.* 1916. Feb. 24. Vol. 42. No. 8. pp. 226–227.

It was found that many samples of this particular dried Dieudonné medium [this *Bulletin*, Vol. 6, p. 43] had lost their selective properties and allowed of the growth of other organisms besides *V. cholerae*. It seemed as if, possibly owing to drying at too high a temperature, too much alkali had been absorbed. The author remedied this by dissolving the powder in ·2 per cent. soda solution. He found also that the addition of 2 per cent. cane sugar to Dieudonné (fresh or dried) was to be recommended as a means of furthering the rapid growth of *V. cholerae*.

H. S.

Verzár (Fritz) & Weszeczky (Oskar). **Zur Stuhluntersuchung auf Typhus- und Cholerabazillen.** [Stool Examination for Typhoid and Cholera Bacilli.]—*Deut. Med. Woch.* 1916. Apr. 20. Vol. 42. No. 16. pp. 476–477. With 2 figs.

A plea for the importance of plating out all peptone water enrichment cultures regardless of whether vibrios are seen in the hanging

drop preparation or not. Four hundred peptone water cultures were plated on to alkaline agar after examination in hanging drop and the results compared.

Of 17 cases which contained many vibrios after 18–24 hours at 37° C. seven had shown none at the end of the sixth hour, although plates spread at that time gave positive results. Five peptone waters from whose agar plates *V. cholerae* were isolated, showed no vibrios even after 18–24 hours at 37° C.

H. S.

Beauverie (J.). **Recherches sur l'influence de la pression osmotique sur les bactéries. Cas du vibrion cholérique.**—*C. R. Acad. Sci.* 1916. Oct. 30. Vol. 165. No. 18. pp. 494–497.

By carrying out the cultivation of *V. cholerae* in ordinary broth and broth containing 7, 9, 15, 20, 30, 50, 90 and 100 per mille Na Cl [except in one instance " per cent." is always and obviously erroneously printed] it was seen that while growth was visible in ordinary broth after four hours and after 24 hours in all concentrations up to but not over 50 per mille, the thickest pellicle formation was observed in the 30 per mille tubes.

Cultures in 30 to 50 per mille concentrations, however, age quickly, showing involution forms and loss of motility within a few days.

The author after pointing out that limitation of nutriment and accumulation of toxins are the factors determining involution, suggests that osmotic pressure may influence toxin formation and in this way explain the rapid degeneration of the vibrios growing in media of raised Na Cl content which, to begin with, favoured development.

The marked pellicle formation occasioned by a 30 per mille concentration of Na Cl suggests to the author an advantage in raising the salt content of peptone water from 5 per mille to that figure in order to facilitate the diagnosis of cholera.

H. S.

Jastrowitz (H.). **Cholera und Paratyphus B.**—*Deut. Med. Woch.* 1916. Aug. 10. Vol. 42. No. 32. pp. 973–974. With 1 chart.

A case of simultaneously acquired cholera and paratyphoid B is described and the necessity pointed out of not allowing a light cholera attack, such as often occurs in the inoculated, to be overlooked because one cause of gastro-enteritic symptoms, namely paratyphoid B bacilli, has already been discovered.

H. S.

Arneth. **Zur Behandlung der Cholera.** [Cholera Therapy.]—*Deut. Med. Woch.* 1916. Aug. 3. Vol. 42. No. 31. pp. 935–938.

The author believes strongly in the efficacy of Bolus alba, to be given in the early stages and in large quantities ; he also advises its use as a prophylactic, served out to soldiers for putting in the tea of their water bottles, when they advance into infected country.

The usual measures—saline infusions, warmth, stimulants such as caffein, strophanthus, etc., are mentioned also.

H. S.

Fejes (Ludwig). **Die praktische Bedeutung der Typhus und Cholera-schutzimpfung.** [The Practical Importance of Typhoid and Cholera Prophylactic Inoculation.]—*Deut. Med. Woch.* 1916. Apr. 6. Vol. 42. No. 14. pp. 412–413.

After calling attention to the great change in the clinical features that is observable in typhoid patients who have been prophylactically inoculated against typhoid, the author goes on to point out that in the case of those protected by inoculation against cholera, a subsequently contracted attack of cholera is not so very much altered in character. Diarrhoea and vomiting are present and bring about a tremendous loss of body fluid with all its pronounced consequences. Only the more specific toxic effects such as those on the nervous system are wanting. This the author explains as follows :—

The morbid processes in cholera are restricted almost entirely to the intestinal tract. It is here in the intestinal epithelium that the cholera toxins are liberated, but in this circumscribed area the immune powers of the inoculated are not of much avail. Consequently the loss of fluid by the body and the symptoms that result are much the same in both inoculated and uninoculated. Only when we come to the influence of the toxin on more distant parts of the body such as the nervous system, are we able to see the beneficial effect afforded by prophylactic inoculation, the toxins being prevented from reaching those parts.

H. S.